

**EXHIBIT 1**

**Declaration of Dr.**

**Shoemake Regarding**

**Claim Construction**

**IN THE UNITED STATES DISTRICT COURT  
FOR THE WESTERN DISTRICT OF TEXAS  
WACO DIVISION**

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**WSOU Investments, LLC d/b/a Brazos  
Licensing and Development,**

Plaintiff,

v.

**NEC Corporation,**

Defendant.

Case No.: 6:20-cv-00923-ADA

Case No.: 6:20-cv-00924-ADA

Case No.: 6:20-cv-00925-ADA

Case No.: 6:20-cv-00926-ADA

Case No.: 6:20-cv-00927-ADA

**Jury Trial Demanded**

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**DECLARATION OF DR. MATTHEW SHOEMAKE, PH.D., REGARDING CLAIM  
CONSTRUCTION**

I declare, under penalty of perjury, that all statements made in this Declaration based on my own knowledge are true, and that all statements made based on information and belief are believed by me to be true. I have been warned, and I understand, that willful false statements and the like are punishable by fine, imprisonment, or both (18 U.S.C. § 1001).

Date: September 10, 2021

By:   
Matthew B. Shoemake, Ph.D.

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## **I. INTRODUCTION**

1. My name is Matthew B. Shoemake, Ph.D. I have been retained on behalf of Defendant NEC Corporation (“NEC”) to opine and provide expert testimony related to U.S. Patent Nos. 7,885,398 (“the ’398 patent”) and 8,103,213 (“the ’213 patent”).

2. In this declaration, I opine on the scope and meaning of certain claim terms that appear in the ’398 and ’213 patents. Relatedly, I also provide an overview of the ’398 and ’213 patents, their technologies, and their fields of art as of the filing dates of those patents.

3. In this declaration, I also opine on the level of ordinary skill in the art for each of the ’398 and ’213 patents, which is relevant to understanding how a person of ordinary skill in the art (“POSITA”) would understand the scope and meaning of the claims of those patents.

4. This declaration is based on the information currently available to me. To the extent additional information becomes available, I reserve the right to amend and supplement this statement and my analysis and opinions. My understanding is that Plaintiff WSOU Investments, LLC d/b/a Brazos Licensing and Development (“WSOU”) has disclosed Dr. Nathaniel Polish who may opine on the ’398 and ’213 patents. To the extent that Dr. Polish, or any other expert, provides testimony or evidence related to the scope and meaning of the ’398 and ’213 patents, or that WSOU provides new information about its proposed constructions or in response to my opinions and related to NEC’s proposed constructions, I reserve the right to review and respond.

5. My understanding is that the Court will hold a claim construction hearing. If I am called upon to testify at this hearing or any other proceeding about this declaration, I may cite other documents or information similar to that specifically identified herein or that is responsive to any testimony or evidence provided by WSOU. I may also prepare and use presentations, graphics, animations, demonstrations, and other aids to explain my analysis and opinions.

## II. SUMMARY OF OPINIONS

### A. Summary of Claim Construction Opinions For The '398 Patent

6. My understanding is that WSOU has asserted claims 1, 10, and 13 of the '398 patent. My further understanding is that NEC and WSOU dispute the scope and meaning of certain claim terms that appear in claims 1, 10, and 13 of the '398 patent, as well as their dependent claims to the extent that the same claim terms appear in the dependent claims.

7. My understanding is that the earliest priority date for the '398 patent is March 6, 2006, the date U.S. Patent Application No. 11/367,401 was filed from which the '398 patent issued. As of that date, a POSITA for the '398 patent would have had (i) a bachelor's degree in electrical engineering, computer science, or computer engineering, or undergraduate training in an equivalent field, and (ii) at least two years of experience in telecommunication technology. Additional graduate education could substitute for professional experience, and significant work experience could substitute for formal education.

8. In my opinion, NEC's proposed constructions for the following terms are correct, and WSOU's proposed constructions are incorrect, for the reasons discussed in this declaration. Specifically, a POSITA would have found the claim terms to have the meaning proposed by NEC or found those terms to be indefinite where NEC has proposed that the term is indefinite.

<b>"Load balancing" – '398 Patent Claims 1, 10, and 13</b>	
<b>NEC's Construction</b>	<b>WSOU's Construction</b>
"splitting communication into two (or more) routes and balancing the traffic on each route"	No construction necessary – plain and ordinary meaning, which is "process of managing the routing of network traffic over two or more routes"

<b>"Service category criterion" – '398 Patent Claims 1, 10, and 13</b>	
<b>NEC's Construction</b>	<b>WSOU's Construction</b>
<i>Indefinite</i>	No construction necessary – plain and ordinary meaning

**B. Summary of Claim Construction Opinions For The '213 Patent**

9. My understanding is that WSOU has asserted claims 1, 8, and 22–26 of the '213 patent. My further understanding is that NEC and WSOU dispute the scope and meaning of certain claim terms that appear in claims 1, 8, and 22–26 of the '213 patent.

10. My understanding is that the earliest priority date for the '213 patent is September 3, 2008, the date U.S. Patent Application No. 12/203,746 was filed from which the '213 patent issued. As of that date, a POSITA for the '213 patent would have had (i) a bachelor's degree in electrical engineering, computer science, or computer engineering, or undergraduate training in an equivalent field, and (ii) at least two years of experience in telecommunication technology. Additional graduate education could substitute for professional experience, and significant work experience could substitute for formal education.

11. In my opinion, NEC's proposed constructions for the following terms are correct, and WSOU's proposed constructions are incorrect, for the reasons discussed in this declaration. Specifically, a POSITA would have found the claim terms to have the meaning proposed by NEC or found those terms to be indefinite where NEC has proposed that the term is indefinite.

**1. The "Means For," "Computer Program Code Configured To," And "The Processor Being Configured To" Claim Terms**

12. My understanding is that NEC and WSOU dispute whether certain terms are so-called "means-plus-function" or similar terms, in which the claim terms recite the function to be performed. These terms may begin with the words "means for," "computer program code configured to," or "the processor being configured to." My understanding is that NEC and WSOU may also dispute what corresponding structure or algorithm is clearly linked to perform the claimed function and, in some instances, whether any structure or algorithm for the function is disclosed by the specification.

13. In my opinion, the terms “means for,” “computer program code configured to,” and “processor being configured to” in the disputed claim terms of the ’213 patent do not connote specific structure for performing the specific functions that are recited following this language. “Means for” is a placeholder and does not connote structure to a POSITA. “Computer program code configured to” similarly indicates, at most, generic computer program code and does not connote to a POSITA any specific algorithm, instructions, steps, processes, or other structure for performing functions that are recited following this language. “Processor being configured to” would only connote a general-purpose processor to a POSITA and, similarly, does not connote any particular, special purpose processor, nor does it connote any specific algorithm, instructions, steps, processes, or other structure that the processor might execute in order to be configured for performing the claimed functions. Further, the term “configured to” in conjunction with the word “processor” connotes to a POSITA that either the computer program code or processor must be specially adapted to perform a claimed function. Nor do the claims of the ’213 patent themselves describe or provide any means for how to configure the processor or computer program code to perform the claimed function.

14. Because the claims do not provide or connote the structure for performing the claimed function, I reviewed the specification of the ’213 patent in an attempt to identify the structure that it clearly links to performing the claimed functions, and to assess whether any disclosed structure was sufficient to perform the claimed functions. However, when I reviewed the specification of the ’213 patent, I determined that the specification fails to disclose or clearly link any specific algorithm, instructions, steps, processes, or other specific function for performing the claimed functions of the disputed “means for,” “computer program code configured to,” and “processor being configured to” claim terms. Instead, the specification recites only a “black box”

apparatus, without any disclosure of specific substructures that are clearly linked to performing and also are sufficient to perform the claimed functions. This includes the specification's failure to disclose and clearly link any specific algorithms, steps, or instructions for performing the functions of these claim terms. Accordingly, it is my opinion that each of these claim terms fails to inform, with reasonable certainty, a POSITA about the meaning and scope of these claim terms and their alleged inventions.

15. I understand that WSOU has identified several portions of the specification that allegedly describe algorithms or other structure that implement the claimed functions for some of these claim terms. For the reasons discussed in this declaration, I disagree that these identified portions of the specification disclose algorithms or other sufficient structure to perform the claimed functions, and I also disagree that these portions are clearly linked to performing the claimed functions by the specification. Instead, WSOU's specification citations: (1) repeat the claimed function, and only assert the function is possible without providing sufficient corresponding details; (2) describe other functions that are not the claimed function at issue; or (3) describe black-box structures for the recited function without any accompanying algorithm or other sufficient structure.

16. As an example, each of these claims recites means for "formulating" or "implementing" a configuration in the apparatus. The portions of the specification that WSOU cites are either irrelevant to formulating or implementing *a configuration*, or else simply repeat the words "formulate" or "implement" without any further description of what structures perform these functions and how they do so. WSOU does not identify any portion of the specification as setting forth structures or algorithms corresponding to the analogous "computer program code configured to" or "processor being configured to" claims. For these reasons, as well as those

further discussed in this declaration, it is my opinion that these claim terms lack any clearly linked, sufficient, corresponding structure or algorithm disclosed by the specification.

17. It is my understanding that WSOU may also assert that the “means for,” “computer program code configured to,” and/or “processor being configured to” claims should be given their plain and ordinary meaning and do not need to be construed at all. Relatedly, my understanding is that WSOU’s position may be that the claims themselves already disclose sufficient structure for performing the functions recited by these terms. I disagree, and a POSITA would not understand the specification to disclose sufficient structure for performing the recited functions. It is also my understanding that if a claim term begins with the phrase “means for,” then there is a presumption that the claim term has been claimed functionally, rather than disclosing its structure in the claims. My opinion is that a POSITA would understand the “means for” terms to be functionally claimed, and that this presumption is not overcome. Further, as already discussed, a POSITA would also understand from the claim language that the “computer program code configured to” and “processor being configured to” claim terms were similarly functionally claimed, rather than disclosing structure for performing the claimed function in the claims themselves.

18. In my opinion, therefore, NEC’s proposed constructions for the following terms are correct, and WSOU’s proposed constructions are incorrect, for the reasons discussed in this declaration. This includes my opinion that these terms are “means-plus-function” or similar terms where the claim language does not disclose the structure for the claim term, requiring a POSITA to look to the specification. This includes my opinion that as I explain in this declaration, there is no clearly linked, sufficient, corresponding structure or algorithm disclosed by the specification, and that the structure that WSOU has identified for its assertion that there is a plain and ordinary

meaning for these claim terms are incorrect. Because many of these terms have the same or very similar functional language, differing only by the initial language (*i.e.*, “means for,” “computer program code configured to,” and/or “processor being configured to”), I have grouped the claim terms having similar functional language accordingly, and discuss them together in this declaration.

19. Following are the “means for” and “computer program code configured to ...” terms for claims 8 and 22. As discussed above, NEC’s proposed constructions are correct, and WSOU’s proposed constructions are incorrect.

<b>“Means for formulating a configuration in the apparatus” – ’213 Patent Claim 22</b>	
<b>“Computer program code configured to formulate a configuration in the apparatus” – ’213 Patent Claim 8</b>	
<b>NEC’s Construction</b>	<b>WSOU’s Construction</b>
<p><i>Indefinite.</i></p> <p>“Means for ...” and “computer program code configured to ...” terms both governed by 35 U.S.C. § 112, ¶ 6.</p> <p><u>Function</u>: [formulating / to formulate] a configuration in the apparatus.</p> <p><u>Structure/material/acts</u>: <i>No sufficient structure disclosed or clearly-linked; no specific hardware, software, program, algorithm, or steps.</i></p>	<p><b>“Means for formulating ... apparatus”:</b> Governed by 35 U.S.C. § 112, ¶ 6. This term is not indefinite.</p> <p><u>Function</u>: formulating a configuration in the apparatus.</p> <p><u>Structure/material/acts</u>: For example, apparatus A and process 4 of Fig. 13, apparatus 1102 <u>and software modules 1110-1118</u> of Fig. 12, apparatus 1104 of Fig. 11, <u>communications module 230 of Fig. 2, memory 330 and processor 300 of Figs. 3, 7A, 8A, 9A, or 11, software-defined radio module 1102 and software modules 1110-1118 of Fig. 12, and step 1418 of Fig. 14A,</u> and the corresponding portions of the specification at <u>6:17-30, 17:34-44, 50:7-22, 8:60-9:5, 17:8-52, 18:4-60, 20:35-44, 21:1-3, and 21:43-48,</u> and equivalents thereof.</p>

	<p><b><u>“Computer program code configured to formulate ... apparatus”</u></b>: Not governed by 35 U.S.C. § 112, ¶ 6. This term is not indefinite. No construction necessary – plain and ordinary meaning.</p> <p><u>To the extent, however, that the Court treats the term as means-plus-function, the function and structure identified above (except that “software modules 1110-1118,” “processor 300” and “software-defined radio module 1102” were not identified for this term, and only 18:4-6 and 18:45-60 were identified (instead of 18:4-60)).</u></p>
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<p><b>“Means for implementing the configuration in the apparatus” – ’213 Patent Claim 22</b></p> <p><b>“Computer program code configured to implement the configuration in the apparatus” – ’213 Patent Claim 8</b></p>	
NEC’s Construction	WSOU’s Construction
<p><i>Indefinite.</i></p> <p>“Means for ...” and “computer program code configured to ...” terms both governed by 35 U.S.C. § 112, ¶ 6.</p> <p><u>Function</u>: [implementing / to implement] the configuration in the apparatus.</p> <p><u>Structure/material/acts</u>: <i>No sufficient structure disclosed or clearly-linked; no specific hardware, software, program, algorithm, or steps.</i></p>	<p><b><u>“Means for implementing ... apparatus”</u></b>: Governed by 35 U.S.C. § 112, ¶ 6. This term is not indefinite.</p> <p><u>Function</u>: implementing the configuration in the apparatus.</p> <p><u>Structure/material/acts</u>: For example, apparatus A and process 6 of Fig. 13, apparatus 1102 of Fig. 12, apparatus 1104 of Fig. 11, <u>communications module 230 of Fig. 2, memory 330 and processor 300 of Figs. 3, 7A, 8A, 9A, or 11, software-defined radio module 1102 and software modules 1110-1118 of Fig. 12, and the corresponding portions of the specification at 6:17-30, 6:50-7:22, 8:60- 9:5, 17:834-4452, 18:4-60, 20:49-53, 21:1-3, and 21:52-56, and equivalents thereof.</u></p> <p><b><u>“Computer program code configured to implement ... apparatus”</u></b>: Not governed by 35 U.S.C. § 112, ¶ 6. This term is not indefinite. No construction necessary – plain and ordinary meaning.</p>



	<p><u>To the extent, however, that the Court treats the term as means-plus-function, the function and structure identified above (except that “processor 300” and “software-defined radio module 1102” were not identified for this term, and “step 1422 of Fig. 14A” was identified, and only 18:4-6 and 18:45-60 were identified (instead of 18:4-60)).</u></p>
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<p><b>“Means for establishing communication between the apparatus and at least one other apparatus in accordance with the configuration” – ’213 Patent Claim 22</b></p> <p><b>“Computer program code configured to establish communication between the apparatus and at least one other apparatus in accordance with the configuration” – ’213 Patent Claim 8</b></p>	
NEC’s Construction	WSOU’s Construction
<p><i>Indefinite.</i></p> <p>“Means for ...” and “computer program code configured to ...” terms both governed by 35 U.S.C. § 112, ¶ 6.</p> <p><u>Function</u>: [establishing / to establish] communication between the apparatus and at least one other apparatus in accordance with the configuration.</p> <p><u>Structure/material/acts</u>: <i>No sufficient structure disclosed or clearly-linked; no specific hardware, software, program, algorithm, or steps.</i></p>	<p><b><u>“Means for establishing ... with the configuration”</u></b>: Governed by 35 U.S.C. § 112, ¶ 6. This term is not indefinite.</p> <p><u>Function</u>: establishing communication between the apparatus and at least one other apparatus in accordance with the configuration.</p> <p><u>Structure/material/acts</u>: For example, apparatus A and process 8 of Fig. 13, apparatus B of Fig. 13, <u>communications module 230 of Fig. 2, memory 330 and processor 300 of Figs. 3, 7A, 8A, 9A, or 11, software-defined radio module 1102 and software modules 1110-1118 of Fig. 12, and step 1424 of Fig. 14A,</u> and the corresponding portions of the specification at <u>6:17-30, 6:50-7:22, 8:60-9:5, 17:8-52, 18:4-60, 20:53-56, 21:1-3, and 21:52-56,</u> and equivalents thereof.</p> <p><b><u>“Computer program code configured to establish ... with the configuration”</u></b>: Not governed by 35 U.S.C. § 112, ¶ 6. This term is not indefinite. No construction necessary – plain and ordinary meaning.</p>

	<p><u>To the extent, however, that the Court treats the term as means-plus-function, the function and structure identified above (except that “processor 300” and “software-defined radio module 1102” were not identified for this term, and only 18:4-6 and 18:45-60 were identified (instead of 18:4-60)).</u></p>
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20. Following are the “means for,” “computer program code configured to,” and “the processor being configured to” terms for claims 24, 25, and 26. As discussed above, NEC’s proposed constructions are correct, and WSOU’s proposed constructions are incorrect.

<p><b>“Means for implementing the configuration in the apparatus” – ’213 Patent Claim 26</b></p> <p><b>“Computer program code configured to implement the configuration in the apparatus” – ’213 Patent Claim 24</b></p> <p><b>“The processor being configured to implement the configuration in the apparatus” – ’213 Patent Claim 25</b></p>	
NEC’s Construction	WSOU’s Construction
<p><i>Indefinite.</i></p> <p>“Means for ...,” and “computer program code configured to ...,” and “the processor being configured to ...” terms all governed by 35 U.S.C. § 112, ¶ 6.</p> <p><u>Function</u>: [implementing / to implement] the configuration in the apparatus.</p> <p><u>Structure/material/acts</u>: <i>No sufficient structure disclosed or clearly-linked; no specific hardware, software, program, algorithm, or steps.</i></p>	<p><b><u>“Means for implementing ... apparatus”:</u></b> Governed by 35 U.S.C. § 112, ¶ 6. This term is not indefinite.</p> <p><u>Function</u>: implementing the configuration in the apparatus.</p> <p><u>Structure/material/acts</u>: For example, apparatus B (1302) and process 7 of Fig. 13, <u>communications module 230 of Fig. 2, memory 330 and processor 300 of Figs. 3, 7A, 8A, 9A, or 11, software-defined radio module 1102 and software modules 1110-1118 of Fig. 12, and step 1468 of Fig. 14B,</u> and the corresponding portions of the specification at <u>6:17-30, 6:50-7:22, 8:60-9:5, 17:8-52, 18:4-6, 18:45-60, 20:49-53, 22:11-15, and 22:56-65,</u> and equivalents thereof.</p>

	<p><b><u>“Computer program code configured to implement ... apparatus”</u></b>: Not governed by 35 U.S.C. § 112, ¶ 6. This term is not indefinite. No construction necessary – plain and ordinary meaning.</p> <p><u>To the extent, however, that the Court treats the term as means-plus-function, the function and structure identified above (except that “processor 300” and “software-defined radio module 1102” were not identified for this term).</u></p> <p><b><u>“The processor being configured to implement ... apparatus”</u></b>: Not governed by 35 U.S.C. § 112, ¶ 6. This term is not indefinite. No construction necessary – plain and ordinary meaning.</p> <p><u>To the extent, however, that the Court treats the term as means-plus-function, the function and structure identified above.</u></p>
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<p><b>“Means for establishing communication in accordance with the configuration” – ’213 Patent Claim 26</b></p> <p><b>“Computer program code configured to establish communication in accordance with the configuration” – ’213 Patent Claim 24</b></p> <p><b>“The processor being configured to establish communication in accordance with the configuration” – ’213 Patent Claim 25</b></p>	
NEC’s Construction	WSOU’s Construction
<p><i>Indefinite.</i></p> <p>“Means for ...,” and “computer program code configured to ...,” and “the processor being configured to ...” terms all governed by 35 U.S.C. § 112, ¶ 6.</p> <p><u>Function</u>: [establishing / to establish] communication in accordance with the configuration.</p> <p><u>Structure/material/acts</u>: <i>No sufficient structure disclosed or clearly-linked; no</i></p>	<p><b><u>“Means for establishing ... configuration”</u></b>: Governed by 35 U.S.C. § 112, ¶ 6. This term is not indefinite.</p> <p><u>Function</u>: establishing communication in accordance with the configuration.</p> <p><u>Structure/material/acts</u>: For example, apparatus B (1302) and process 8 of Fig. 13, <u>communications module 230 of Fig. 2, memory</u></p>

<p><i>specific hardware, software, program, algorithm, or steps.</i></p>	<p><u>330 and processor 300 of Figs. 3, 7A, 8A, 9A, or 11, software-defined radio module 1102 and software modules 1110-1118 of Fig. 12, and step 1456 of Fig. 14B, and the corresponding portions of the specification at 6:17-30, 6:50-7:22, 8:60-9:5, 17:8-52, 18:4-6, 18:45-60, 20:53-56, 22:11-15, and 22:65-67, and equivalents thereof.</u></p> <p><b><u>“Computer program code configured to establish ... configuration”</u></b>: Not governed by 35 U.S.C. § 112, ¶ 6. This term is not indefinite. No construction necessary – plain and ordinary meaning.</p> <p><u>To the extent, however, that the Court treats the term as means-plus-function, the function and structure identified above (except that “processor 300” and “software-defined radio module 1102” were not identified for this term).</u></p> <p><b><u>“The processor being configured to establish ... configuration”</u></b>: Not governed by 35 U.S.C. § 112, ¶ 6. This term is not indefinite. No construction necessary – plain and ordinary meaning.</p> <p><u>To the extent, however, that the Court treats the term as means-plus-function, the function and structure identified above.</u></p>
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## 2. The Remaining Claim Terms

21. My further understanding is that NEC and WSOU also dispute the scope and meaning of certain claim terms that are not “means-plus-function” or similar terms.<sup>1</sup> In my

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<sup>1</sup> My understanding is that NEC and WSOU also dispute the meaning of the claim term “at least one of supported communication transport configuration information for the [at least one other] apparatus, power status information for the [at least one other] apparatus, processing load information for the [at least one other] apparatus, communication load information for the [at least one other] apparatus, proximate interference information for the [at least one other] apparatus and user preferences configured in the [at least one other] apparatus.” Specifically, my understanding is NEC and WSOU dispute whether this phrase refers to a conjunctive list requiring one of each item that is part of the list (which is NEC’s position) or a disjunctive list requiring only one item

opinion, NEC's proposed constructions for the following terms are correct, and WSOU's proposed constructions are incorrect, for the reasons discussed in this declaration.

<b>"Communication load information for the [at least one other] apparatus" – '213 Patent Claims 1, 8, 22, 23, 24, 25, and 26</b>	
<b>NEC's Construction</b>	<b>WSOU's Construction</b>
"communication load of an internal controller in the [at least one other] apparatus"	No construction necessary – plain and ordinary meaning, which is "information regarding communication load for the [at least one other] apparatus"

<b>"Power status information" – '213 Patent Claims 1, 8, 22, 23, 24, 25, and 26</b>	
<b>NEC's Construction</b>	<b>WSOU's Construction</b>
<i>Indefinite</i>	No construction necessary – plain and ordinary meaning

<b>"Proximate interference information for the [at least one other] apparatus" – '213 Patent Claims 1, 8, 22, 23, 24, 25, and 26</b>	
<b>NEC's Construction</b>	<b>WSOU's Construction</b>
<i>Indefinite</i>	No construction necessary – plain and ordinary meaning

WSOU's Disclosure Of Preliminary Claim Constructions And Extrinsic Evidence at Exhibit A (August 5, 2021); NEC's Preliminary Claim Constructions And Extrinsic Evidence (August 5, 2021).

22. Below, I summarize in this section my educational background, career history, publications, and other relevant qualifications. My full curriculum vitae is attached as Exhibit A to this statement.

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from all of the items that are part of the list (which is WSOU's position). My understanding is this is a purely legal issue that does not require expert testimony. As a result, I have not been asked to present any expert opinion on this term and dispute, and I do not do so herein. My not rendering any opinion on this issue should not in any way be inferred to indicate which party's position on this issue is correct, and I reserve the right to respond to any arguments or testimony by WSOU or its technical expert on this issue that is expert (as opposed to purely legal) in nature.

23. I have earned Ph.D. and master's degrees in electrical engineering from Cornell University, as well as two bachelor's degrees, one in electrical engineering and another in computer science, from Texas A&M University. I have thirty years of experience in wired and wireless communications technology, including design and development of high-definition video calling systems, ultrawideband chipsets, wireless VGA/DVI systems for notebook computers, Bluetooth and Wi-Fi coexistence technology, very low power Wi-Fi technology for mobile phones, and 802.11b compliant physical layers.

24. My full curriculum vitae, attached as Exhibit A, contains a list of all other cases in which, during the previous 4 years, I have testified as an expert at trial or by deposition.

### **III. MATERIALS CONSIDERED**

25. To prepare this declaration, I have considered and reviewed the '398 patent and its file history, as well as the '213 patent and its file history. I also have considered the competing claim construction proposals of NEC and WSOU. To prepare this declaration, I also have relied upon my education, knowledge and experience with telecommunication and radio systems, wireless systems, networking, computing, and software, as well as my extensive background detailed below. As already discussed, Exhibit A to this declaration is a copy of my curriculum vitae, which further sets forth my education and experience. Exhibit B sets forth a complete list of all materials I have considered to prepare this declaration.

26. To prepare this declaration, I also have relied upon my understanding of certain legal principals regarding claim construction. I am not an expert in patent law. I therefore have relied upon the statement of legal principles set forth in this declaration, conversations with legal counsel as needed to further inform me about relevant legal principles, and also my experience as a technical expert in patent cases including as it relates to claim construction and the meaning of claim terms to a person of ordinary skill in the art.

**IV. COMPENSATION TO BE PAID**

27. I am being paid \$670 per hour for my study and testimony in this matter as it relates to this claim construction declaration. My compensation does not depend upon the outcome of this case, nor does it depend upon the outcome of the Court's claim construction ruling.

**V. LEGAL PRINCIPLES FOR CLAIM CONSTRUCTION**

28. Within this declaration, I apply my understanding of certain legal principles to opine on the scope and meaning of the disputed claim terms. However, I am not a lawyer or an expert in patent law. The paragraphs below set forth understanding of these legal principles.

**A. General Claim Construction Principles**

29. My understanding is that a patent claim should be interpreted based on what it would mean to a POSITA as of the priority date of the patent. Among other information, the claim language and the specification are relevant to determining the meaning of the patent claim. Because a claim is interpreted according to its meaning to a POSITA, the knowledge, education, and experience of a POSITA are also relevant to determining the scope and meaning of a patent claim.

30. A primary source for construing a claim term is the plain and ordinary meaning to a POSITA of the claim term itself, if the POSITA would understand that there is one in the context of the specification and the prosecution history. My understanding is that the claims are to be construed from the terms as written. The language of the claims is not to be rewritten through interpretation. Other claims in the patent can also be informative because claim terms are normally used consistently throughout the patent. It is also my understanding that language in a claim should not be construed so as to render claim language superfluous.

31. I understand that the claims are construed in light of the specification as understood by a POSITA. One should look to the specification and other intrinsic evidence for assistance in

understanding a claim term because a patentee may have ascribed a particular meaning to a term. However, unless stated otherwise in the patent document or the prosecution history, it is my understanding that limitations from the specification generally should not be read into the claims.

32. I also understand that the prosecution history of a patent provides the record of the examination of a patent application before the U.S. Patent and Trademark Office (PTO). The prosecution history provides evidence of how the patent examiner and the inventor understood the patent application and the claims and can therefore be instructive on how to interpret the claims. It is my understanding that arguments or amendments made concerning one patent application can be instructive as to the meaning of like terms in another related patent application.

33. My understanding is that in certain circumstances, the words in a patent claim may differ from and not be given their plain and ordinary meaning. One circumstance is when the applicants act as their own lexicographer by clearly setting forth a definition of a claim term that may differ from the plain and ordinary meaning it would otherwise possess. Another circumstance is when the applicant includes or provides an intentional disclaimer, or disavowal, of claim scope. My understanding is that an applicant may act as their own lexicographer, or disclaim or disavow claim scope, in either the specification or the prosecution history of the patent, for example, by making amendments to the claims during prosecution or by making assertions to the PTO about the differences between the claimed inventions and the prior art.

34. My understanding is that extrinsic evidence may also be used in understanding the meaning of a claim term. Extrinsic evidence includes dictionaries, treatises, expert testimony, and prior art. But I understand that one should first look to the intrinsic evidence in construing the claims.



**B. “Means Plus Function” Terms and Terms Governed By 35 U.S.C. § 112, ¶ 6**

35. My understanding is that an element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof. Specifically, 35 U.S.C. § 112, ¶ 6 states:

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

36. My understanding is that when a claim is drafted functionally in this way, instead of reciting the structure, material, or acts, then the claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof. As a result, when a claim is drafted in this way, my understanding is that a POSITA must then look to the specification to identify the corresponding structure, material, or acts that the specification discloses for performing the specified function.

37. It is my understanding that when a claim limitation begins with “means for” and then recites a function, it is presumed that the claim term shall be construed according to 35 U.S.C. § 112, ¶ 6 above, i.e., that it “shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.” My understanding is that in this case, NEC and WSOU agree that all claim limitations in dispute beginning with “means for” are subject to 35 U.S.C. § 112, ¶ 6.

38. When the claim is subject to 35 U.S.C. § 112, ¶ 6, it is my understanding that the specification must clearly link the structure, material, or acts for performing the specified function to the function itself. And, it is my understanding that the structure, material, or act must be sufficient for performing the specified function, and must actually be for performing that function

and not some other function. My understanding is that if the specification fails to clearly link corresponding, sufficient structure for performing the specified structure, then the claim term is indefinite.

39. In addition to claim limitations beginning with “means for,” it is my understanding that other claim limitations can also be drafted according to 35 U.S.C. § 112, ¶ 6. I understand that while a claim term not using the words “means for” is presumed to not be governed by 35 U.S.C. § 112, ¶ 6, that presumption is overcome when the claim recites a generic placeholder for structure (i.e., a nonstructural nonce word) further using functional language, and there is insufficient structure in the claim to perform the claimed function. My understanding is that if the claim limitation is drafted functionally, and the claim itself does not identify the structure, material, or acts for performing the function, then the claim is to be construed according to 35 U.S.C. § 112, ¶ 6, even if the words “means for” are not used. Specifically, my understanding is NEC and WSOU dispute whether certain functional phrases that begin “computer program code being configured to” and “the processor being configured to” have been drafted according to 35 U.S.C. § 112, ¶ 6. As I discuss elsewhere in this declaration, my opinion is that a POSITA would understand that these claim limitations do not recite the structure, material, or acts that perform the functions recited by these limitations.

40. It is my understanding that when a patent is silent as to the structure of a program code, 35 U.S.C. § 112, ¶ 6 may apply to claim terms that begin with “computer program code.” I understand that such silence may be found if the patent does not indicate that a program code refers to a specific existing code or disclose what that code is. My understanding is that in such situation, a conventional 35 U.S.C. § 112, ¶ 6 two-step inquiry is applied to determine whether these claim terms are indefinite. The first step is to identify the claimed function. The second step is to

determine what structure, if any, disclosed in the specification corresponds to the claimed function. It is my understanding that such term may be indefinite if the patent does not disclose an algorithm or procedure that explains how the program code accomplishes the claimed function. As I discuss elsewhere in this declaration, my opinion is that a POSITA would have understood that claim limitations that begin with “computer program code” do not refer to a specific existing code or disclose what that code is. As discussed below, a POSITA would not have understood the specification to disclose an algorithm explaining how the claimed function of the “computer program code” terms is performed.

41. It is my understanding that 35 U.S.C. § 112, ¶ 6 may apply to claim terms that begin with “processor being configure to” if the descriptions of the exemplary embodiments in the specifications do not detail the objectives and operations of the “processor being configured to...” terms in a way that connotes structure sufficient to avoid the application of § 112, ¶ 6. I understand that such terms may be governed by 35 U.S.C. § 112, ¶ 6 where the patent does not sufficiently recite or describe how the “processor being configured to...” terms operate with the other claimed components or where each processor is defined only by the function that it performs. It is my understanding that if “processor being configure to” terms are found to be governed by 35 U.S.C. § 112, ¶ 6, the specification must disclose sufficient structure to satisfy the functional claiming requirements under § 112, ¶ 6. It is my opinion that a POSITA would have understood that the processors recited in certain claims are defined only by the function they perform, and that specification lack sufficient explanation of how the processors operate with other claimed components. Furthermore, it is my opinion that a POSITA would have understood that the specification did not disclose sufficient structure for these terms.

42. It is my understanding that in a means-plus-function claim in which the disclosed structure is a computer, or microprocessor, programmed to carry out an algorithm, the disclosed structure is not the general-purpose computer, but rather the special purpose computer programmed to perform the disclosed algorithm. According to my understanding, if a recited function requires special programming, then the specification must disclose the algorithm that the computer performs to accomplish that function. My understanding is that a means-plus-function claim element for which the only disclosed structure is a general-purpose computer is invalid if the specification fails to disclose an algorithm for performing the claimed function. It is my opinion that a POSITA would have understood that the specification failed to disclose an algorithm for performing many claim limitations that begin with “means for,” “computer program code being configured to,” and “the processor being configured to.”

### **C. Indefiniteness and Terms of Degree**

43. My understanding is that a patent claim is indefinite if the claim fails to inform, with reasonable certainty, those skilled in the art about the scope of the invention, when the claim is read in light of the specification and the prosecution history.

44. For means plus function terms or other terms drafted according to 35 U.S.C. § 112, ¶ 6, my understanding is those terms are indefinite if the specification fails to disclose and clearly link structure, material, or acts to the claimed function, or that the specification’s structure is insufficient to perform the claimed function. My understanding is that it must be the specification that performs this disclosure of clearly-linked, sufficient structure for performing the specified function, and that expert testimony cannot be a substitute for the specification doing so.

45. My understanding is certain patent claim terms may also be so-called terms of degree, meaning that the term uses a word or terminology that implicates some amount, level, or extent (e.g., “big” or “small,” “high” or “low,” “close” or “far,” etc.). My understanding is that

for a term of degree, the specification must provide objective boundaries about the meaning of the degree and the range of amounts or values that are within the claim scope, as well as outside of the claim scope. My further understanding is that if the specification does not provide any objective boundaries for the meaning and scope of the term of degree, then the term is indefinite.

## **VI. ANALYSIS OF U.S. PATENT NO. 7,885,398**

### **A. Overview and Technology Background**

46. The '398 patent is titled "Multiple Criteria Based Load Balancing" and was filed on March 6, 2006. '398 patent at (54), (22). The face of the patent identifies Alcatel Lucent as the original assignee of the patent. '398 patent at (73). The named inventors are identified as Neeraj Chandra and Gerardo Martin Espinosa. '398 patent at (75).

47. The '398 patent generally relates to routing calls across and performing load balancing of calls in a communication network. According to its Abstract:

This invention provides the ability to load balance calls in a communications network using a certain criterion, such as a user-specified call priority, or the call service category. The method is applied when selecting a route for a new call or for re-balancing the calls across a network. When the user-specified call priority is used, the aggregated number of calls with the same priority or service category is calculated for all possible routes the new call may use. The aggregated number of calls is then divided by the number of hops in the respective routes; the route with the smallest ratio is selected for the new call. Re-balancing is performed by re-routing the calls in such a way as to obtain a similar number of calls of the same priority, or service category along all possible routes.

Thus, the '398 patent generally relates to using certain criteria to determine how to route calls across a network, as well as balancing the load on the network such as on its nodes and components that results from communicating calls across the network based upon the chosen routing. This is further discussed in other parts of the '398 patent. For example, the specification explains that:

Load balancing attempts to fairly distribut[e] the traffic over all the links of the network to avoid a local congestion in particular resources and to better utilize the resources across the network.

'398 patent at 1:42-45. Load balancing pre-dated the '398 patent, and POSITAs were already aware of the desirability and, in many cases, need to load balance networks to decrease congestion and increase efficiency. This is accomplished by splitting network traffic<sup>2</sup> in a particular way across the different network routes, as information is sent from a source node to a destination node through intermediate nodes.

#### **B. The Asserted Claims and Disputed Claim Language**

48. My understanding is WSOU has asserted claims 1, 10, and 13 of the '398 patent. I have reproduced those claims below, with the disputed claim terms shown in ***bold italics*** and further annotated in different colors depending upon the particular disputed claim term. The same or similar terms are shown in the same color.

##### **Claim 1:**

[1.pre] A method of routing calls across a communication network with per-call ***load balancing***, the method comprising:

[1.a] identifying at least two possible alternate routes for a new call;

[1.b] determining a first route performance value for each said possible route, for a call attribute corresponding to a bandwidth criterion;

[1.c] determining a second route performance value for each said possible route, for a call attribute corresponding to a priority criterion;

[1.d] determining a third route performance value for each said possible route, for a call attribute corresponding to a ***service category criterion***;

[1.e] selecting a route from the at least two possible alternate routes to carry said new call based on adding together said first route

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<sup>2</sup> *Splitting* of traffic may also be referred to as *distributing* or *allocating* of traffic.

performance value, said second route performance value, and said third route performance value.

**Claim 10:**

[10.pre] A system that performs *load balancing* of calls in a communication network, the system comprising:

[10.a] a routing module that selects a list of possible alternate routes between a user-specified source and a destination;

[10.b] a *load balancing* criteria module that receives a configuration form from a user that specifies selection criteria used for *load balancing*; a link attribute processing unit that receives the selection criteria from the *load balancing* criteria module and the list of possible alternate routes from the routing module;

[10.c] a first aggregated attribute calculation unit that determines a first route performance value for the list of possible alternate routes for a call attribute corresponding to a bandwidth criterion;

[10.d] a second aggregated attribute calculation unit that determines a second route performance value for the list of possible alternate routes for a call attribute corresponding to a priority criterion;

[10.e] a third aggregated attribute calculation unit that determines a third route performance value for the list of possible alternate routes for a call attribute corresponding to a *service category criterion*; and

[10.f] a route selector that selects a route for a new call from said list of possible alternate routes, based on adding together said first route performance value, said second route performance value, and said third route performance value.

**Claim 13:**

[13.pre] A system that performs *load balancing* of calls between a source and a destination within a communication network, the system comprising:

[13.a] a routing module that selects a list of possible alternate routes between said source and said destination;

[13.b] a *load balancing* criteria module that receives a configuration form from a user that specifies selection criteria used for *load balancing*; a link attribute processing unit that receives the selection criteria from the *load balancing* criteria module and the list of possible alternate routes from the routing module;

[13.c] a first aggregated attribute calculation unit that determines a first route performance value for the list of possible alternate routes for a call attribute corresponding to a bandwidth criterion;

[13.d] a second aggregated attribute calculation unit that determines a second route performance value for the list of possible alternate routes for a call attribute corresponding to a priority criterion;

[13.e] a third aggregated attribute calculation unit that determines a third route performance value for the list of possible alternate routes for a call attribute corresponding to a *service category criterion*;

[13.f] a scoring unit that provides a route score, based on adding together said first route performance value, said second route performance value, and said third route performance value for each route in the list of possible alternate routes; and

[13.g] a route selector that selects a route for a new call to be routed between said source and said destination, based on said route score.

**C. Person of Ordinary Skill in the Art (“POSITA”)**

49. I am informed and understand that the claims of a patent are judged from the perspective of a hypothetical construct involving a “person of ordinary skill in the art,” or POSITA. The “art” is the field of technology to which the patent is related. I understand that the purpose of using the viewpoint of a POSITA is for objectivity. I understand that a POSITA is presumed to know and be familiar with all of the relevant art in the field at the time of invention and is also presumed to possess an average level of creativity.

50. I understand the earliest priority date for the ’398 patent is March 6, 2006, the date U.S. Patent Application No. 11/367,401 was filed from which the ’398 patent issued. It is my opinion that a POSITA for the ’398 patent would have had (i) a bachelor’s degree in electrical engineering, computer science, or computer engineering, or undergraduate training in an equivalent field, and (ii) at least two years of experience in telecommunication technology. Additional graduate education could substitute for professional experience, and significant work experience could substitute for formal education.



**D. Construction of the Disputed Claim Terms of the '398 patent****1. “load balancing”**

<b>“Load balancing” – '398 Patent Claims 1, 10, and 13</b>	
<b>NEC's Construction</b>	<b>WSOU's Construction</b>
“splitting communication into two (or more) routes and balancing the traffic on each route”	No construction necessary – plain and ordinary meaning, which is “process of managing the routing of network traffic over two or more routes”

51. The claim term “load balancing” appears in each of claims 1, 10, and 13. Particularly, “load balancing” is recited in the preamble of each of claims 1, 10, and 13, as well as the following limitations shown below:

[10.b] a *load balancing* criteria module that receives a configuration form from a user that specifies selection criteria used for *load balancing*; a link attribute processing unit that receives the selection criteria from the *load balancing* criteria module and the list of possible alternate routes from the routing module;

[13.b] a *load balancing* criteria module that receives a configuration form from a user that specifies selection criteria used for *load balancing*; a link attribute processing unit that receives the selection criteria from the *load balancing* criteria module and the list of possible alternate routes from the routing module;

As shown by this claim language and the preambles of each claim, the claims recite methods or systems for routing calls by performing load balancing. In claims 10 and 13, for instance, this load balancing is performed specifically by a “load balancing criteria module” that receives “a configuration form from a user that specifies selection criteria used for load balancing,” as well as a “link attribute processing unit” that “receives the selection criteria from the load balancing criteria module.” In each of claims 1, 10, and 13, the claims further recite determining a first, second, and third “route performance value,” and then selecting a route from the at least two possible alternate routes based on adding together these route performance values. However, the claims do not identify how the first, second, and third route performance values are calculated

(other than that they correspond to a selection criterion, *i.e.*, bandwidth, priority, or “service category”). Nor do they describe how adding together these route performance values achieves “load balancing.” For these reasons, while a POSITA would generally recognize “load balancing” in the telecommunications context to mean the balancing of traffic (or “load”) across multiple routes by distributing communications across those routes, I have turned to the specification and file history of the ’398 patent in an attempt to further understand the meaning of “load balancing” as it is used in the claims of the ’398 patent.

52. The specification of the ’398 patent does not expressly define the term “load balancing,” but it does describe the objective of “load balancing” as follows:

Load balancing attempts to fairly distributing [sic] the traffic over all the links of the network to avoid a local congestion in particular resources and to better utilize the resources across the network.

’398 patent at 1:42–45. The specification then goes on to describe the prior art, explaining that, at the time of filing, “the most common criteria for load balancing [were] based on determining an aggregated [bandwidth] (aggregated over multiple hops) for each possible route for a call, and selecting the route with the lowest aggregated utilization for a new call.” ’398 patent at 1:46–49. But, according to the specification, “[t]he problem with this approach is that the users do not have any involvement in the routing of their calls.” ’398 patent at 1:61–62. Rather, the inventors for the ’398 patent believed that “in order to successfully manage the traffic across a PVC switched digital network it is important not only to allocate sufficient bandwidth for each connection from the knowledge of the source characteristics and the network status, but also to take into account user-specified criteria.” ’398 patent at 1:62–67. For this reason, the ’398 patent discloses using three criteria: bandwidth, priority, and “service category.” *See, e.g.*, ’398 patent at 5:61–63.

53. The specification of the ’398 patent provides some examples of how to calculate “route performance values” for each of these three criteria in “scenarios” 1 through 4. *See* ’398

patent at 6:49–9:19. For the route performance value corresponding to “service category,” for instance (see scenario 1), the specification explains that “we take into account all calls-in-progress with” a certain “service category” (Q1) “from all calls along the respective links of the possible routes R1 and R2.” ’398 patent at 6:53–56. In this scenario and example, the specification states that for route R1:

For route R1:  $1 \times Q1 \text{ (link A-B)} + 3 \times Q1 \text{ (link B-D)} = 4$ , which means that an aggregate of four calls have a service category of Q1. The service category average is determined by dividing the aggregate number of calls with a service category of Q1 to the number of hops along the route. This results in a service category average of  $4: 2 \text{ hops} = 2$ .

The specification then states the for route R2:

For route R2:  $1 \times Q1 \text{ (link A-C)} + 1 \times Q1 \text{ (link C-D)} = 2$ , which means that an aggregate of two calls have a service category of Q1. The service category average is determined again by dividing the aggregate number of calls with service category=Q1 to the number of hops. This results in a service category average of  $2: 2 \text{ hops} = 1$ . Route R2 is therefore selected for the new call as it offers a path with a smaller average number of service category calls belonging to the same category (Q1). dividing the aggregate number of calls with service category=Q1 to the number of hops. This results in a service category average of  $2: 2 \text{ hops} = 1$ . Route R2 is therefore selected for the new call as it offers a path with a smaller average number of service category calls belonging to the same category (Q1).

54. This “service category” method calculates the total number of calls occurring on the route at a specific service category and then divides by the number of hops. This gives an average number of calls for that service category on a per hop basis on that route. Thus selecting a route with the “service category average” tends to balance or equalize the average number of calls on a per hop basis across the possible routes.

55. The specification explains that load balancing based on priority is performed in a similar fashion. *See* ’398 patent at 7:8–27 (scenario 2). Finally, the specification describes that

load balancing based on bandwidth may be performed by selecting a path for a new call having “the minimum bandwidth utilization.” ’398 patent at 7:31–34.

56. After reading the specification of the ’398 patent, it becomes more clear that “load balancing,” as that term is used in each of claims 1, 10, and 13, refers to splitting communication across multiple routes to distribute the traffic or load across each route (for instance, by selecting a route for a new call having the minimum active bandwidth utilization compared to all other possible routes). By selecting the route with the minimum utilization, whether that utilization be calculated as average number of calls per hop or utilization, for example, the routing decision tends to balance or equalize the load across the available routes.

57. For these reasons, WSOU’s proposed construction of the term “load balancing” is insufficient and flawed. WSOU’s proposed construction, specifically, is lacking in that it does not include any language referring to the distribution of load across the different routes and has therefore read out of the term both “load” and “balancing.” In other words, a “process of managing the routing of network traffic over two or more routes” need not necessarily involve distributing call load across the possible routes by, for instance, determining at the outset of each new call which route has the lowest bandwidth utilization, and selecting that route for the new call. Rather, a “process of managing the routing of network traffic over two or more routes” may instead involve always sending traffic from certain source locations over certain, preselected routes, regardless of whether there are other, less utilized routes that are available. For the reasons discussed, a POSITA reading the claims and specification of the ’398 patent would not have understood the claim term “load balancing” to be this encompassing.

58. For all of the reasons discussed above, it is my opinion that the claim term “load balancing” is instead better construed to mean “splitting communication into two (or more) routes and balancing the traffic on each route.”

## 2. “service category criterion”

<b>“Service category criterion” – ’398 Patent Claims 1, 10, and 13</b>	
<b>NEC’s Construction</b>	<b>WSOU’s Construction</b>
<i>Indefinite</i>	No construction necessary – plain and ordinary meaning

59. The claim term “service category criterion” appears in three limitations of claims 1, 10, and 13 of the ’398 patent. Those limitations are shown below:

[1.d] determining a third route performance value for each said possible route, for a call attribute corresponding to a *service category criterion*;

[10.e] a third aggregated attribute calculation unit that determines a third route performance value for the list of possible alternate routes for a call attribute corresponding to a *service category criterion*; and

[13.e] a third aggregated attribute calculation unit that determines a third route performance value for the list of possible alternate routes for a call attribute corresponding to a *service category criterion*;

As shown by this claim language, the claims recite determining a third route performance value for the list of possible routes (including, for claims 10 and 13, that this is done by a “third aggregated calculation unit”), and that this determination is done “for a call attribute corresponding to a service value criterion.” The claim language does not provide any information about what it means by a “service category criterion.” Further, there is no plain and ordinary meaning of this term to a POSITA when looking only at the claim language. The term “service category criterion” is a generic term that, in this context, has no particular meaning to a POSITA. It is unclear what “service” is being referred to, or what category or categories would be or qualify as a “service category.” It also is unclear what is meant by “criterion,” and what criteria would qualify as a

“criterion” for a “service category” for these limitations. In sum, the claim language alone fails to inform a POSITA with reasonable certainty as to the meaning of the term “service category criterion,” which does not have a plain and ordinary or otherwise clear and understood meaning to a POSITA. As a result, I have turned to the specification and file history of the ’398 patent in an attempt to further understand the meaning of “service category criterion”.

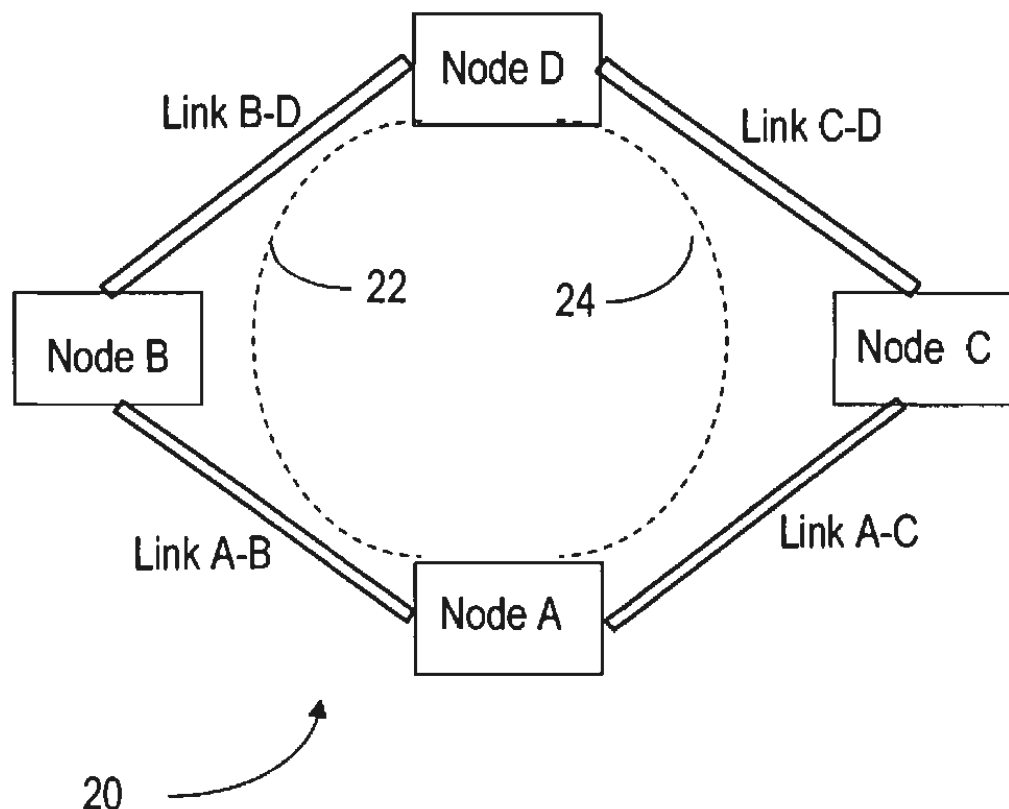
60. The specification does not resolve the lack of clarity about the meaning of “service category criterion.” Instead, the specification uses the phrase “service category” in a fairly generic sense that seems to assume that a POSITA would already know what this phrase means. But, as I have already explained, there is no plain and ordinary meaning of “service category” for a call or call routing. Further, the specification does not explain what is meant by “criterion,” what is a “service category criterion,” or how to determine what such a criterion is for particular routes. For example, the abstract uses the phrase “call service category” and refers to calculating the “service category” along all possible routes. ’398 patent at (57). But the abstract does not explain what is meant by a call “service category,” and it also never refers to “criterion” for the call service category. Similarly, the background of the invention refers generically to certain “criteria” and “criterion” that could be used for managing traffic and routing calls, stating that “[a]nother criterion could for example be the service category of the calls,” but providing no further explanation of what is meant by either this “service category” or “criterion” for this category. ’398 patent at 2:4–5. The specification goes on to state:

A call is also defined by one or more attributes. An example of a user-specified call attribute (or a user-specified attribute) is the call priority, or a *call service category*, call bandwidth, etc.

’398 patent at 4:9–12 (emphasis added). Other than stating that a “call service category” may be user-defined, this portion of the specification again does not explain what is meant by a “service category,” “criterion” for a service category, or how a “service category criterion” is determined

for different possible call routes. In fact, this category only adds further uncertainty to a POSITA about the meaning of “call service category,” because it is unclear who the user is or what that user is supposedly specifying as an attribute of the call service category. Other portions of the specification similarly use the phrase “service category” without explaining what it is, what “criterion” for a service category is, or how to determine and apply “service category criterion” in order to determine a “route performance value” as claimed in the patent claims. *See* ’398 patent at, e.g., 5:35–36 (stating only that “the aggregated attribute calculation unit ... can also be used for call service category”); 5:61–63 (stating only that Figure 1’s system enables load balancing “based on a user-specified criterion, such as call service category,” without any further explanation); and 6:5–14 (stating only that if two possible routes have the same priority, then performance of the selected routes may be determined “with respect to call service category,” without any further explanation of what is meant by “call service category” or any criterion associated with it); 7:63–8:5 (stating only that system operators can use “call service category” as one of multiple load-balancing criteria). None of these portions of the specification explain the meaning of “service category” or “criterion” for a call service category that is used to determine a route performance value.

61. The closest the specification comes to explaining what is meant by a “service category” and “service category criterion” is the explanation of Figure 2 and discussion of Scenario 1 from column 2, line 15 through column 3, line 6. Figure 2, reproduced below, show two possible call routings from Node A to Node D. The first possible routing route R1, denoted with 22, through Node B using links A-B and B-D, and the second possible routing is route R2, denoted with 24, through Node C using links A-C and B-D.



See '398 patent at 6:42–45. The specification states that for this example, “we assume there could be only three service category levels, where Q1 is the highest, Q2 is the medium and Q3 the lowest” for a particular node-to-node link. '398 patent at 6:20–22. The specification then provides Table 1 including different attributes for the different links A-B, B-D, A-C, and C-D.

TABLE 1

	Link A-B	Link B-D	Link A-C	Link C-D
No. of calls (N)	5	10	8	8
BW Consumed	10 M	25 M	10 M	20 M
Priority (P)	3 × P5, 1 × P2, 1 × P1	4 × P5, 5 × P2, 1 × P1	3 × P5, 3 × P2, 2 × P1	3 × P5, 3 × P2, 2 × P1
Service category (Q)	1 × Q1, 2 × Q2, 2 × Q3	3 × Q1, 5 × Q2, 2 × Q3	1 × Q1, 5 × Q2, 2 × Q3	1 × Q1, 5 × Q2, 2 × Q3



'398 patent at 6:26–37. However, none of this disclosure explains to a POSITA what “Service Category (Q)” actually is, what is meant by a higher or lower service category (and the values Q1, Q2, and Q3), or what the claimed “service category criterion” is. The specification once again assumes that a POSITA would understand the meaning of a link-to-link service category for each of links A-B, B-D, A-C, and C-D in this example without any further explanation. The same is true for the subsequent example the specification provides for “Scenario 1: Service Category as the Only Load Balancing Criterion.” *See* '398 patent at 6:48–7:6. In this scenario and example, the specification states that for route R1:

1xQ1 (link A-B)+3xQ1 (link B-D)=4, which means that an aggregate of four calls have a service category of Q1. The service category average is determined by dividing the aggregate number of calls with a service category of Q1 to the number of hops along the route. This results in a service category average of 4: 2 hops=2.

The specification then states that for route R2:

1xQ1 (link A-C)+1xQ1 (link C-D)=2, which means that an aggregate of two calls have a service category of Q1. The service category average is determined again by dividing the aggregate number of calls with service category=Q1 to the number of hops. This results in a service category average of 2: 2 hops=1. Route R2 is therefore selected for the new call as it offers a path with a smaller average number of service category calls belonging to the same category (Q1). dividing the aggregate number of calls with service category=Q1 to the number of hops. This results in a service category average of 2: 2 hops=1. Route R2 is therefore selected for the new call as it offers a path with a smaller average number of service category calls belonging to the same category (Q1).

None of this very brief explanation reasonably informs a POSITA as to what the “service category” being referred to actually is (i.e., what are Q1, Q2, and Q3), how to determine them for different links and call routes, or what the “criterion” for determining a service category are. Accordingly, the specification does not inform a POSITA of what is meant by “service category criterion” in the claim language.

62. I also note that a POSITA, when reading the '398 patent specification, would not assume that service category and “service category criterion” refer to general features such as bandwidth or prioritization of calls that might affect call quality between links. It is clear this is not what is meant by “service category” criterion because other portions of the specification discuss using “call priority” and “bandwidth” as separate and distinct load balancing *criterion*. *See, e.g.*, '398 patent at 7:7–28 (Scenario 2 example using prioritization as the only load balancing criterion) and 7:30–63 (Scenario 3 example using bandwidth as the only load balancing criterion). Further, the patent claims recite “a bandwidth criterion” and “a priority criterion” as separate and distinct load balancing criteria from “service category criterion.” My understanding is patent claim language is supposed to be construed to give meaning to different language, and a POSITA reading the patent claims would understand that “service category criterion” must be something different than call bandwidth (or “a bandwidth criterion”) or call prioritization (or “a priority criterion”).

63. In summary, from the specification, it remains unclear to a POSITA what is meant by “service category” or performing load balancing using “service category criterion.” The specification fails to inform a POSITA with reasonable certainty as to what is meant by these terms, instead simply assuming that a POSITA would know what they mean. But a POSITA would not know what “service category criterion” means, because this term is vague and has no plain and ordinary, accepted meaning to a POSITA, and the specification provides no context or discussion to reasonably inform a POSITA as to the terms’ meaning.

64. I also reviewed the file history to determine whether it could aid in resolving this ambiguity and vagueness as to the meaning of “service category criterion.” The file history does not provide any additional context in which to resolve with reasonable certainty a definite meaning for the term “service category criterion.”

65. For all of the reasons discussed above, in my opinion, the claim term “service category criterion” is indefinite because it has no plain and ordinary meaning, and the claim language, specification, and file history fail to inform a POSITA with reasonable certainty what is meant by “service category criterion.”

## **VII. ANALYSIS OF U.S. PATENT NO. 8,103,213**

### **A. Overview and Technology Background**

66. The '213 patent is titled “Software-Defined Radio Configuration” and was filed on September 3, 2008. '213 patent at (54), (22). The face of the patent identifies Nokia Corporation as the original assignee of the patent. '213 patent at (73). The named inventor is identified as Pertti Tolonen. '213 patent at (75).

67. The '213 patent generally relates to reconfigurable software modules that are used for configuring a software-defined radio. According to the '213 patent's Abstract:

A system for configuring communication resources that are at least partially based upon reconfigurable software modules. An apparatus may utilize a plurality of transports for communication, wherein the transports are supported by one or more radio modules. The one or more radio modules may comprise hardware-based radio modules and software-defined radio (SDR) modules including a reconfigurable software element that allows the radio module to emulate the functionality of multiple hardware-based radios. In accordance with at least one embodiment of the present invention, SDR modules in an apparatus may formulate a communication configuration for use in communicating with another apparatus based on remote characteristic information (e.g., information corresponding to the apparatus with which communication is desired) and local characteristic information pertaining to the apparatus.

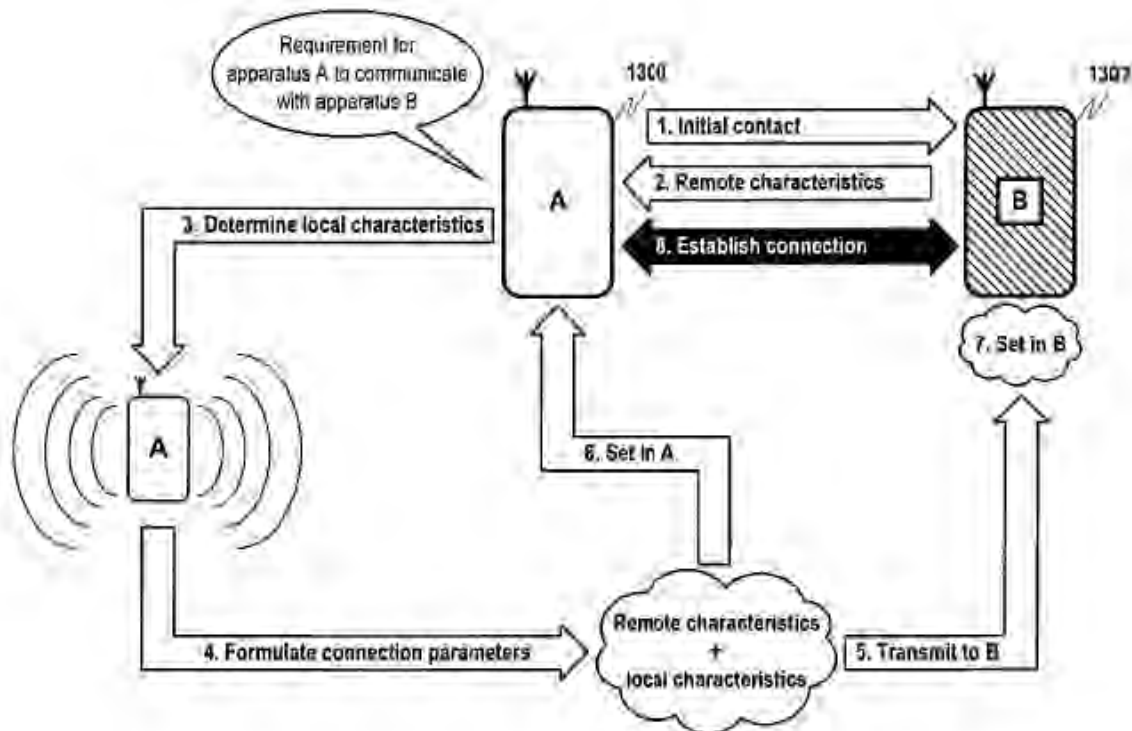
Thus, the '213 patent generally relates to being able to use software to reconfigure a radio for a particular communication configuration.

68. The '213 patent “relates to wireless communication, and more specifically, to a system for facilitating wireless communication connections between configurable radio devices.”

'213 patent at 1:7-10. As acknowledged in the specification, “wireless communication devices (WCDs) have become common for both personal and business use, allowing users to transmit and receive voice, text and graphical data from a multitude of geographic locations.” *Id.* at 1:15-18. A large variety of communication protocols have been developed for both long range communication networks and short range wireless networks. *Id.* at 1:21-67. To accommodate that variety of networks and protocols, a concept of configuring communication devices (such as a radio or a wireless modem) to communicate via a particular protocol was well known at the time of filing the '213 patent. A POSITA would have known of such configuration methods disclosed in multiple references, including the IEEE 802.11 standard mentioned in the '213 patent itself (*id.* at 1:65-67), and references such as Abe (US 2008/0200195) discussed by the Examiner in the '213 prosecution history. *See, e.g.,* Abe at [0003] (“a method of selectively switching between communication schemes in use according to wireless transmission path conditions after making a configuration of a wireless station a so-called multimode configuration that is compatible with a plurality of wireless communication schemes has been considered”).

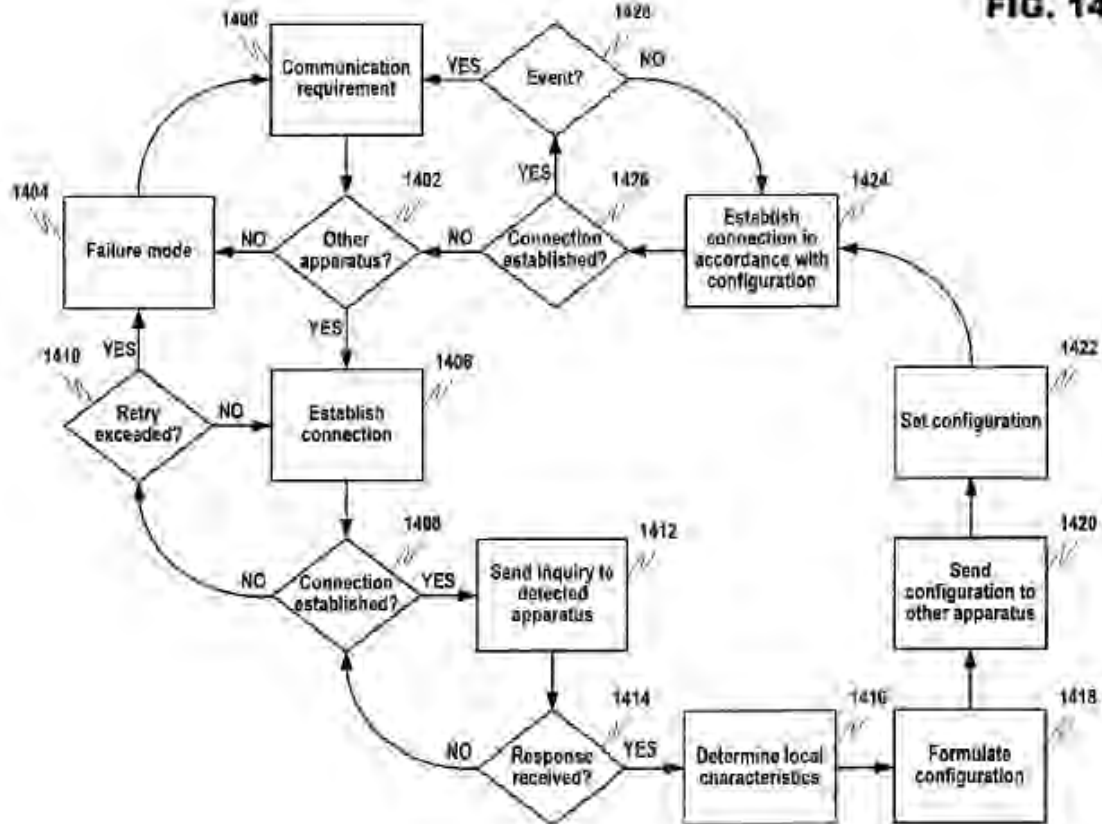
69. Embodiments of the '213 patent are directed to methods and systems “for configuring communication resources that are at least partially based upon reconfigurable software modules.” '213 patent at 2:43-47. The main concept discussed in the patent is to allow communication between two apparatuses, such as radio modules. This is accomplished by the first apparatus making an inquiry to the second apparatus, receiving a response from the second apparatus containing remote configuration information, formulating a configuration based on that response and on local configuration information, and then sending the formulated configuration back to the second apparatus. *See* '213 patent at 2:61-3:30. However, the specification of the '213 patent does not go much beyond generic steps and high-level conceptual block diagrams. While

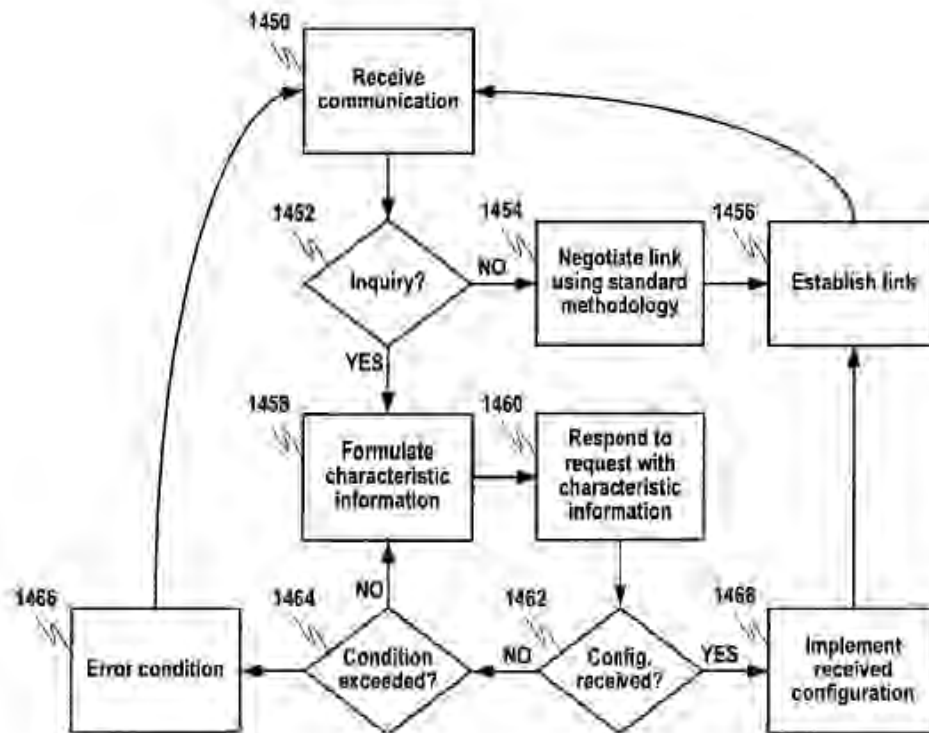
there are a number of Figures attached to the '213 patent, most of them simply present a variety of high-level well-known general concepts classified into conventional bins of short-range, close-proximity, and long-range communications. *See, e.g.*, '213 patent at Figs. 1-9. Figure 13, reproduced below, and its accompanying text, do not provide any substantive description of the embodiments. The first and second apparatuses are represented by empty boxes A (representing "Apparatus A") and B (representing "Apparatus B"), without any discussion of physical or software implementation details. Key steps are represented by annotated arrows, without any details of hardware or software required to support them.



Figures 14A and 14B, reproduced below, are high-level block diagrams representing the concept from the point of view of Apparatus A and Apparatus B, respectively. A POSITA would not have understood from these figures or their accompanying text, how to implement the so-called embodiments of the patent.

FIG. 14A



**FIG. 14B**

### B. The Asserted Claims and Disputed Claim Language

70. My understanding is WSOU has asserted claims 1, 8, and 22–26 of the '213 patent. I have reproduced those claims below, with the disputed claim terms shown in ***bold italics*** and further annotated in different colors depending upon the particular disputed claim term. The same or similar terms are shown in the same color. Because the language of claims 8 and 22 are similar, I show them side-by-side in the first table below. Similarly, because the language of claims 24, 25, and 26 are similar, I show them side by side in the second table below. For the “means for,” “computer program code configured to,” and “the processor being configured to” claim terms, I have not shown those terms in ***bold italics*** because the entirety of those terms are disputed. Instead, for these terms, the leading annotation of each grouping of these terms is highlighted in yellow.

#### Claim 1:



[1.pre] A method, comprising:

[1.a] initiating an inquiry from an apparatus to at least one other apparatus;

[1.b] receiving remote characteristic information into the apparatus, the remote characteristic information comprising at least one of supported communication transport configuration information for the at least one other apparatus, *power status information* for the at least one other apparatus, processing load information for the at least one other apparatus, *communication load information for the at least one other apparatus*, *proximate interference information for the at least one other apparatus* and user preferences configured in the at least one other apparatus;

[1.c] determining local characteristic information in the apparatus;

[1.d] formulating a configuration in the apparatus, the configuration being based on the remote characteristic information and the local characteristic information;

[1.e] sending the configuration from the apparatus to the at least one other apparatus; implementing the configuration in the apparatus; and

[1.f] establishing communication between the apparatus and at least one other apparatus in accordance with the configuration.

**Claims 8 and 22:**

Claim 22 – “Means for”	Claim 8 – “Computer program code configured to”
[22.pre] An apparatus, comprising:	[8.pre] A computer program product comprising computer executable program code recorded on a computer readable medium, the computer executable program code comprising:
[22.a] means for initiating an inquiry from the apparatus to at least one other apparatus;	[8.a] computer program code configured to initiate an inquiry from an apparatus to at least one other apparatus;
[22.b] means for receiving remote characteristic information into the apparatus, the remote characteristic information comprising at least one of supported communication transport configuration information for the at least one other apparatus, <i>power status information</i> for the at	[8.b] computer program code configured to receive remote characteristic information into the apparatus, the remote characteristic information comprising at least one of supported communication transport configuration information for the at least one other apparatus, <i>power status information</i> for



least one other apparatus, processing load information for the at least one other apparatus, <i>communication load information for the at least one other apparatus</i> , <i>proximate interference information for the at least one other apparatus</i> and user preferences configured in the at least one other apparatus;	the at least one other apparatus, processing load information for the at least one other apparatus, <i>communication load information for the at least one other apparatus</i> , <i>proximate interference information for the at least one other apparatus</i> and user preferences configured in the at least one other apparatus;
[22.c] means for determining local characteristic information in the apparatus;	[8.c] computer program code configured to determine local characteristic information in the apparatus;
[22.d] means for formulating a configuration in the apparatus, the configuration being based on the remote characteristic information and the local characteristic information;	[8.d] computer program code configured to formulate a configuration in the apparatus, the configuration being based on the remote characteristic information and the local characteristic information;
[22.e] means for sending the configuration from the apparatus to the at least one other apparatus;	[8.e] computer program code configured to send the configuration from the apparatus to the at least one other apparatus;
[22.f] means for implementing the configuration in the apparatus; and	[8.f] computer program code configured to implement the configuration in the apparatus; and
[22.g] means for establishing communication between the apparatus and at least one other apparatus in accordance with the configuration.	[8.g] computer program code configured to establish communication between the apparatus and at least one other apparatus in accordance with the configuration.

**Claim 23:**

[23.pre] A method, comprising:

[23.a] receiving wireless communication in an apparatus;

[23.b] if the wireless communication includes an inquiry requesting characteristic information, determining characteristic information comprising at least one of supported communication transport configuration information for the apparatus, *power status information* for the apparatus, processing load information for the apparatus, *communication load information for the apparatus*, *proximate interference information for the apparatus* and user preferences configured in the apparatus;

[23.c] responding to the inquiry, the response comprising the characteristic information;

[23.d] receiving further wireless communication in the apparatus, the further wireless communication including a configuration; implementing the configuration in the apparatus; and

[23.e] establishing communication in accordance with the configuration.

**Claims 24, 25, and 26**

<b>Claim 26 – “Means for”</b>	<b>Claim 24 – “Computer program code configured to”</b>	<b>Claim 25 – “The Processor Being Configured To”</b>
[26.pre] An apparatus, comprising:	[24.pre] A computer program product comprising computer executable program code recorded on a computer readable medium, the computer executable program code comprising:	[25.pre] An apparatus, comprising:
		[25.1] at least one radio module; and
		[25.2] a processor, the processor being configured to:
[26.a] means for receiving wireless communication in an apparatus;	[24.a] computer program code configured to receive wireless communication in an apparatus;	[25.2.a] [the processor being configured to] <sup>3</sup> receive wireless communication in an apparatus;
[26.b] means for, if the wireless communication includes an inquiry requesting characteristic information, determining characteristic information comprising at least one of supported communication transport configuration information for the apparatus, <i>power status information</i> for the apparatus, processing load information for the	[24.b] computer program code configured to, if the wireless communication includes an inquiry requesting characteristic information, determine characteristic information comprising at least one of supported communication transport configuration information for the apparatus, <i>power status information</i> for the apparatus, processing load information for the apparatus,	[25.2.b] [the processor being configured to] if the wireless communication includes an inquiry requesting characteristic information, determine characteristic information comprising at least one of supported communication transport configuration information for the apparatus, <i>power status information</i> for the apparatus, processing load information for the apparatus,

<sup>3</sup> I have added the language “the processor being configured to” before each of claim limitations [25.2.a] to [25.2.f] because that subsequent functional language applies to each of the subparts of the claim limitation [25.2], which recites, “a processor, the processor being configured to:”.

apparatus, <i>communication load information for the apparatus, proximate interference information for the apparatus</i> and user preferences configured in the apparatus;	<i>communication load information for the apparatus, proximate interference information for the apparatus</i> and user preferences configured in the apparatus;	<i>communication load information for the apparatus, proximate interference information for the apparatus</i> and user preferences configured in the apparatus;
[26.c] means for responding to the inquiry, the response comprising the characteristic information;	[24.c] computer program code configured to respond to the inquiry, the response comprising the characteristic information;	[25.2.c] [the processor being configured to] respond to the inquiry, the response comprising the characteristic information;
[26.d] means for receiving further wireless communication in the apparatus, the further wireless communication including a configuration;	[24.d] computer program code configured to receive further wireless communication in the apparatus, the further wireless communication including a configuration;	[25.2.d] [the processor being configured to] receive further wireless communication in the apparatus, the further wireless communication including a configuration;
[26.e] means for implementing the configuration in the apparatus; and	[24.e] computer program code configured to implement the configuration in the apparatus; and	[25.2.e] [the processor being configured to] implement the configuration in the apparatus; and
[26.f] means for establishing communication in accordance with the configuration.	[24.f] computer program code configured to establish communication in accordance with the configuration.	[25.2.f] [the processor being configured to] establish communication in accordance with the configuration.

### C. Person of Ordinary Skill in the Art (“POSITA”)

71. I am informed and understand that the claims of a patent are judged from the perspective of a hypothetical construct involving a “person of ordinary skill in the art,” or POSITA. The “art” is the field of technology to which the patent is related. I understand that the purpose of using the viewpoint of a POSITA is for objectivity. I understand that a POSITA is presumed to know and be familiar with all of the relevant art in the field at the time of invention and is also presumed to possess an average level of creativity.

72. I understand the earliest priority date for the ’213 patent is September 3, 2008, the filing date of the U.S. Patent Application from which the ’213 patent issued. It is my opinion that a POSITA for the ’213 patent would have had (i) a bachelor’s degree in electrical engineering,

computer science, or computer engineering, or undergraduate training in an equivalent field, and (ii) at least two years of experience in telecommunication technology. Additional graduate education could substitute for professional experience, and significant work experience could substitute for formal education.

**D. Construction of the Disputed “Means For,” “Computer Program Code Configured To,” and “The Processor Being Configured To” Claim Terms**

**1. Discussion of Patent Claims 8 and 22**

73. Patent claims 8 and 22 together have seven pairs of claim terms where each pair is written in substantially identical functional language. The first term of the pair from claim 22 recites “means for” performing the specified function, and the second term of the pair from claim 8 recites “computer program code configured to” perform the specified function. Because of this overlap, I discuss these two claims and their seven pairs of claim terms below.

**(a) “means for formulating a configuration in the apparatus” and “computer program code configured to formulate a configuration in the apparatus”**

<b>“Means for formulating a configuration in the apparatus” – ’213 Patent Claim 22</b>	
<b>“Computer program code configured to formulate a configuration in the apparatus” – ’213 Patent Claim 8</b>	
<b>NEC’s Construction</b>	<b>WSOU’s Construction</b>
<p><i>Indefinite.</i></p> <p>“Means for ...” and “computer program code configured to ...” terms both governed by 35 U.S.C. § 112, ¶ 6.</p> <p><u>Function:</u> [formulating / to formulate] a configuration in the apparatus.</p> <p><u>Structure/material/acts:</u> <i>No sufficient structure disclosed or clearly-linked; no specific hardware, software, program, algorithm, or steps.</i></p>	<p><b><u>“Means for formulating ... apparatus”:</u></b> Governed by 35 U.S.C. § 112, ¶ 6. This term is not indefinite.</p> <p><u>Function:</u> formulating a configuration in the apparatus.</p> <p><u>Structure/material/acts:</u> For example, apparatus A and process 4 of Fig. 13, apparatus 1102 <u>and software modules 1110-1118</u> of Fig. 12, apparatus 1104 of Fig. 11, <u>communications module 230 of Fig. 2,</u></p>

	<p><u>memory 330 and processor 300 of Figs. 3, 7A, 8A, 9A, or 11, software-defined radio module 1102 and software modules 1110-1118 of Fig. 12, and step 1418 of Fig. 14A, and the corresponding portions of the specification at <del>6:17-30, 17:34-44, 18:4-60, 20:35-44, 21:1-3, and 21:43-48,</del> and equivalents thereof.</u></p> <p><b><u>“Computer program code configured to formulate ... apparatus”</u></b>: Not governed by 35 U.S.C. § 112, ¶ 6. This term is not indefinite. No construction necessary – plain and ordinary meaning.</p> <p><u>To the extent, however, that the Court treats the term as means-plus-function, the function and structure identified above (except that “software modules 1110-1118,” “processor 300” and “software-defined radio module 1102” were not identified for this term, and only 18:4-6 and 18:45-60 were identified (instead of 18:4-60)).</u></p>
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74. My understanding is that NEC and WSOU agree that of these related terms, the term “means for formulating a configuration in the apparatus” is a means plus function term subject to 35 U.S.C. § 112, ¶ 6. This requires an analysis of what a POSITA would identify is the specified function from the claims, as well as the corresponding structure for performing that function from the specification. My understanding is that NEC and WSOU agree that the specific function is “formulating a configuration in the apparatus.” However, my understanding is that NEC’s position is that there is no sufficient corresponding, clearly-linked structure, material, or acts for performing this function, and that it is therefore indefinite. WSOU, on the other hand, had initially proposed that the corresponding specification structure is:

For example, apparatus A and process 4 of Fig. 13, apparatus 1102 of Fig. 12, apparatus 1104 of Fig. 11, and the corresponding portions of the specification at 17:34-44, 18:4-6, and 20:35-44, and equivalents thereof.

As I explain below, a POSITA would not find that this portion of the specification identified by WSOU is clearly linked, sufficient structure for performing the specified function. As a result, a POSITA would find this “means for ...” term to be indefinite.

75. Because NEC and WSOU agree that this “means for ...” term is subject to 35 U.S.C. § 112, ¶ 6, I have looked to the specification to see if it clearly links any corresponding, sufficient structure for performing the recited function of “formulating a configuration in the apparatus.” The specification does not recite any corresponding, sufficient, or clearly linked structure for performing this function. A POSITA would understand that “formulating a configuration in the apparatus” is a very specific type of function for coming up with a configuration by the apparatus. “Formulating” itself is not a technical term of art to a POSITA. Instead, the specification uses “formulating” as a generic term to refer to taking remote characteristic information received by an apparatus and local characteristic information determined by the apparatus in order to come up with a configuration. However, the specification does not identify any structure of an apparatus that performs this function of formulation of a configuration. Instead, the specification at most discloses very generally and at a high level that an apparatus comes up with some sort of configuration based upon this remote characteristic information and local characteristic information. A POSITA would not understand the specification to disclose, much less clearly link, any particular structure for performing the function of “formulating a configuration in the apparatus.” Because the specification does not disclose or clearly link sufficient structure for performing this specific function, a POSITA would find that the claim term “means for formulating a configuration in the apparatus” is indefinite.

76. I further note that the lack of specification structure corresponding to “means for formulating a configuration in the apparatus” is particularly problematic given the various types

of local and remote characteristic information recited by the '213 patent. As I have already discussed for other limitations, the specification gives a list of certain general examples of characteristic information. '213 patent at 20:10–30 (identifying, for example, “apparatus status and/or environmental conditions proximate to the apparatus,” including apparatus communication capabilities and/or preferences, current apparatus power condition, current apparatus operational condition, current communication activity, proximate signal interference, scheduled communications, and other apparatuses operating in proximity). The claim language itself also identifies different categories of characteristic information following the “at least one of” language, as shown by the emphasized part of the following claim limitation:

**[22.b]** means for receiving *remote characteristic information* into the apparatus, the *remote characteristic information* comprising at least one of *supported communication transport configuration information* for the at least one other apparatus, *power status information* for the at least one other apparatus, *processing load information* for the at least one other apparatus, *communication load information* for the at least one other apparatus, *proximate interference information* for the at least one other apparatus and *user preferences* configured in the at least one other apparatus;

As a result, a POSITA would need and expect there to be very specific corresponding structure disclosed by the specification that takes these different types of characteristic information in order to formulate a configuration. But the specification does not disclose to a POSITA any hardware, software, computer program code, algorithms, steps, instructions, or other structure for “formulating” a configuration using any one of these types of characteristic information. The specification also does not disclose to a POSITA how to use different types of this characteristic information, including both received from another apparatus (e.g., Apparatus B) as well as determined in the formulating apparatus (e.g., Apparatus A) in order to “formulate” and come up with a configuration to be used by both apparatuses (e.g., Apparatus A and Apparatus B). For these reasons, due to the many different types of characteristic information disclosed by the



specification, and also due to the many different types of wireless communications protocols that the specification says a device may support, see '213 patent at 7:23–35 (discussing “long range communications” of, e.g., GSM, WCDMA, GPRS, PCS, and Wi-Max); '213 patent at 7:36–47 (discussing “broadcast communications” of, e.g., analog radio, DVB, and DAB); and '213 patent at 7:48–59 (discussing “short-range communications” of, e.g., Bluetooth, WLAN, UWB, BT-ULP, Wireless USB, Zigbee, and UHF RFID), the lack of any disclosed, clearly-linked, or sufficient corresponding structure for the term “means for formulating a configuration in the apparatus” is particularly problematic. A POSITA would conclude the specification does not disclose or clearly link any sufficient structure for performing this function across these different characteristics, potential devices, and wireless communications protocols, individually or jointly.

77. This indefiniteness is further confirmed by WSOU’s proposed construction of the corresponding structure. As noted above, WSOU initially proposed the following as corresponding structure:

For example, apparatus A and process 4 of Fig. 13, apparatus 1102 of Fig. 12, apparatus 1104 of Fig. 11, and the corresponding portions of the specification at 17:34-44, 18:4-6, and 20:35-44, and equivalents thereof.

The specification does not clearly link this structure to performing the claimed function, and this structure is not sufficient to perform the claimed function. In Fig. 13, “Apparatus A” is drawn as a rectangle with the letter “A” in the center. There is no explanation of what happens inside of the box labeled “A,” and there is no discussion about what feature, code, algorithm, or portion of “A” might formulate a configuration and how it might do so. Box “A” does not provide corresponding *structure* to perform the specific function of “formulating a configuration in the apparatus.” Further, the preamble of the claim language already states that the “apparatus” comprises “means for formulating a configuration in the apparatus.” WSOU’s proposed identification of box “A” as

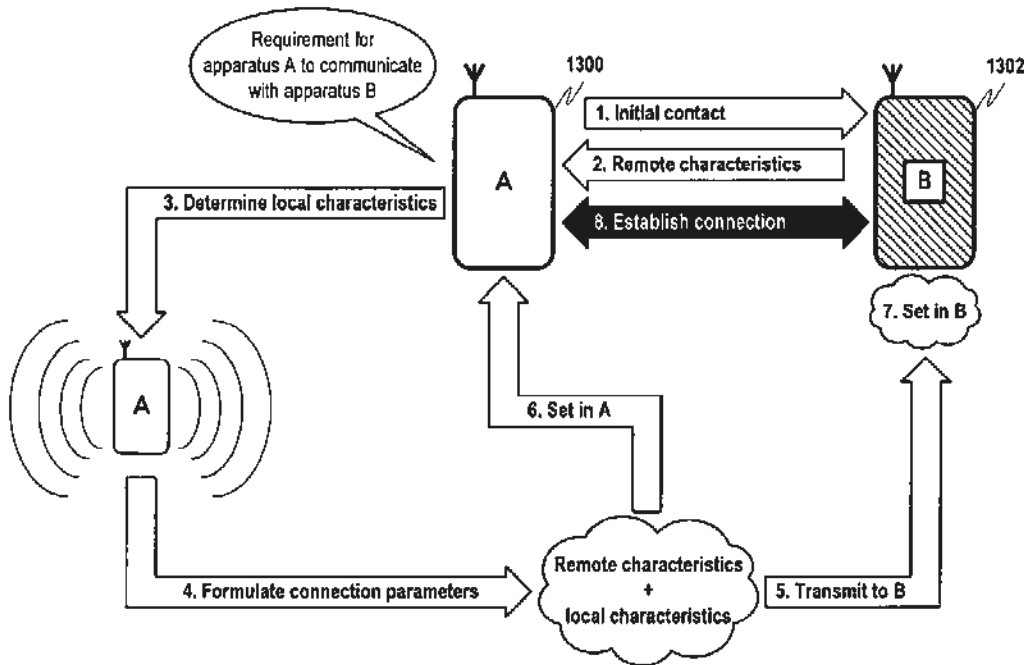


corresponding structure is merely redundant of the functional claim language used, i.e., an apparatus for formulating a configuration in the apparatus. A POSITA would not understand box “A” to be clearly linked structure for performing this “formulating a configuration in the apparatus” function. Indeed, a POSITA would not find box “A” to provide *structure*. It is instead a graphical placeholder for structure that the patent never identifies. As a result, the specification’s “Apparatus A” is not sufficient to perform the claimed function, because there is no disclosure of the required hardware, software, algorithms, steps, computer program code, instructions, or other structure of Apparatus A that is sufficient to perform this claimed function. WSOU’s proposed corresponding structure also identifies “the corresponding portions of the specification at ... 20:35-44.” That portion of the specification is shown below, with emphasis added:

Once Apparatus A 1300 has both the remote and local characteristic information, ***a configuration for SDR module 1102 may be formulated***. The configuration may define a transport, or a list of transports (e.g., in priority order), for use in communication with apparatus B 1302, channel selection for each transport (e.g., hopping patterns), error correction, Quality of Service (QoS) requirements, operational schemes (e.g., power saving, high speed, etc.), radio module priority (for conflict resolution), etc.

A POSITA would understand this portion of the specification to merely state that a configuration is formulated – not what formulates it or how it is formulated. Notably, once Apparatus A has remote and local characteristic information, a configuration may be formulated “for SDR module 1102.” There is no indication as to whether SDR module 1102, itself, “formulates a configuration” or something else does. The remaining part of this portion explains certain things that the configuration “may define” for the SDR. Nonetheless, this part of the specification does not disclose what hardware, software, algorithms, steps, computer program code, instructions, or other structure actually performs the formulation to come up with the configuration, or how to do so. WSOU’s proposal also identifies Figure 13 and its process labeled “4. Formulate connection

parameters,” which are shown below. However, Figure 13, reproduced below, is similarly high-level and fails to provide any meaningful structural detail for what actually happens inside of box “A.”



WSOU’s proposal is incorrect because it appears to identify the entirety of Figure 13. At most, it is only the portion “4. Formulate connection parameters” that a POSITA might look to in seeking to understand how the inventors proposed to “formulat[e] a configuration in the apparatus.” But, as already discussed, Figure 13 and the portion labeled “4. Formulate connection parameters” described at ’213 patent at 20:35–44 fail to disclose any particular or detailed structure for performing the specific “formulation” function. In summary, Figure 13 and the description of its “4. Formulate connection parameters” do not disclose any specific hardware, software, algorithms, steps, computer program code, instructions, or other structure that performs this function which is sufficient, or clearly link any such structure to the function of “formulating a configuration in the apparatus.” For all of these reasons, a POSITA would not understand Figure 13, and the

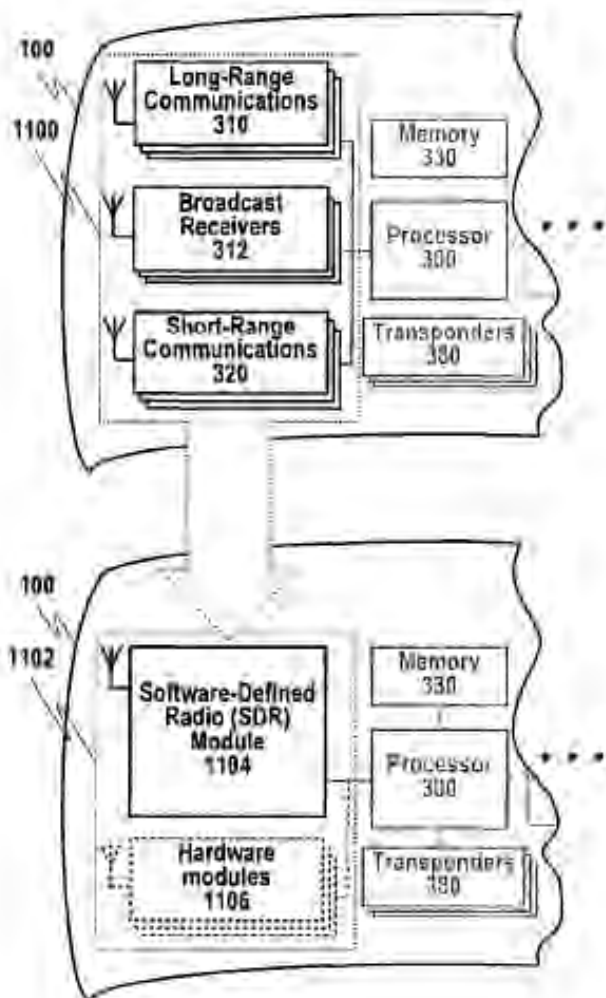
corresponding portions of the specification at 20:35–44, to disclose corresponding, clearly-linked, sufficient structure for performing the claimed function.

78. WSOU’s proposed construction also identifies “Software-Defined Radio (SDR) module” 1102 of Fig. 12 and 1104 of Fig. 11 (which WSOU tellingly renames as “apparatus 1102” and “apparatus 1104” in its proposal), along with “the corresponding portions of the specification at 17:34-44 [and] 18:4-6.” Neither of these portions of the specification or Figures 11 and 12 provides sufficient or clearly-linked corresponding function for the claimed function of “formulating a configuration in the apparatus.” As an initial matter, as discussed in the preceding paragraph, the specification discloses that the formulated configuration is “for SDR module 1102.” ’213 patent at 20:37. As a result, a POSITA would not conclude that an “SDR module” is the clearly-linked corresponding structure to perform the function of “formulating a configuration in the apparatus.” WSOU’s proposed corresponding structure appears to identify only the apparatus for which the configuration is formulated, not what performs the function of “formulating a configuration in the apparatus” or how that configuration is achieved. WSOU also cites to the ’213 patent at 17:34-44, shown below:

For example, an alternative communication configuration for WCD 100 is shown at 1102. In this example, the apparatus may incorporate at least one SDR module 1104 in lieu of one or more discrete hardware-based radio modules. While the flexibility of SDR module 1104 may provide an option of omitting some communication hardware from WCD 100, this does not preclude the incorporation of one or more hardware based modules 1106. Implementations incorporating both SDR radio modules 1104 and hardware-based modules 1106 (represented as optional in FIG. 11 through the use of dotted lines) are possible.

None of the above portion of the specification mentions “formulating” or otherwise coming up with a configuration based upon received remote characteristic information and determined local characteristic information. In fact, the words “characteristic information” are not mentioned in

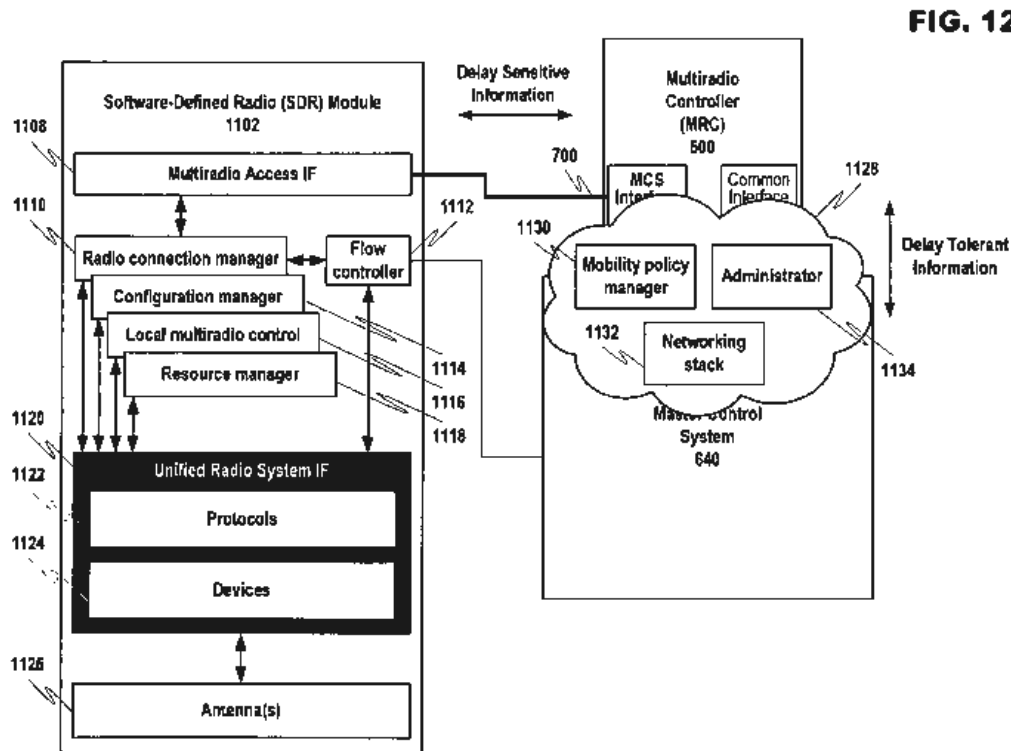
this passage. There is no description of how to formulate a configuration from this information, or what hardware, software, computer program code, algorithms, steps, instructions, or other structure does so. There is not even any example of how to do so using the types of remote characteristic information and local characteristic information described by the specification, or doing so for one of the wireless communication protocols disclosed. At most, this passage only states that some embodiments of the invention may include a so-called software defined radio (SDR). A POSITA would not understand this part of the specification to understand that the SDR performs the claimed formulation function. A POSITA would instead understand and believe that the SDR is a component that could be configured by the configuration information, but only ***once that configuration information had already been “formulated”*** by whatever does so. Figure 11, which WSOU also identifies and is shown below, similarly does not provide any detail or information about any structure that performs this “formulating” function.

**FIG. 11**

As shown above, Figure 11 shows certain generic components as a “black box,” including Software-Defined Radio (SDR) Module 1104 and other components. But Figure 11 does not identify which components, if any, perform the “formulating” function, much less how they do so. The second portion of the specification identified by WSOU, ’213 patent at 18:4-6, is shown below.

FIG. 12 explains an example of a possible implementation of a SDR 1102 utilizing a previously disclosed embodiment of the present invention.

This single sentence says nothing about “formulating” a configuration using received remote characteristic information of determined local configuration information. All it says to a POSITA is the apparatus may have a Software-Defined Radio (SDR) 1102. A POSITA would not understand that this one sentence discloses or clearly links sufficient structure to performing the specific function of “formulating a configuration in the apparatus.” Further, Figure 12 and its disclosure of SDR 1102, reproduced below, similarly do not disclose that SDR 1102 performs this “formulating” function, or any hardware, software, algorithms, steps, computer program code, instructions, or other structure for doing so.



As shown above, the example of Software-Defined Radio Module 1102 in Figure 12 has a Multiradio Access IF 1108, certain “manager” modules 1110, a “flow controller” 1112, a “Unified Radio System IF” 1120 having Protocols 1122 and Devices 1124, and one or more Antennas 1126. None of these sub-components is disclosed or linked by the specification to “formulating a

configuration in the apparatus” from the received remote characteristic information and the determined local characteristic information. See ’213 patent at 18:9–60 (describing these components). A POSITA would not understand from the specification that SDR 1102 of Figure 12 performs this “formulating” function, or that the SDR has sufficient disclosed structure to do so for the different examples and embodiments disclosed.

79. I further observe that it is not inherent or required for a software-defined radio to formulate a configuration. Software-defined radios predate and are prior art to the ’213 patent. In general, a software-defined radio is a communication system whose overall function may be defined in software. This is as opposed to minor configuration selections such as choosing a radio station on an RF radio. Rather in a software-defined radio the overall function of the system may be redefined in software. For example via software the radio may be redefined to be a Wi-Fi system, then a cellular system, and then a Bluetooth system. I further note that this concept of software defined radio is particularly applicable to the physical layer where radios were historically defined to perform a single function such as FM radio without the possibility of redefining the system to act like GPS specifically because the physical layer was optimized to perform a specific to act like one main type of communication system and software could not override the physical design of the circuitry. However, in a software defined radio even these physical layer functions may be override to defined totally new functionality of the radio such as switching from Bluetooth to GPS. Nothing requires a software-defined radio to formulate configurations, or to do so using either received remote characteristic information of received local characteristic information as claimed by the claims. Instead, a software-defined radio is configured using configuration information. As a result, a POSITA would not understand a software-defined radio to perform the “formulating” function, and as I have already explained, the specification does not disclose that

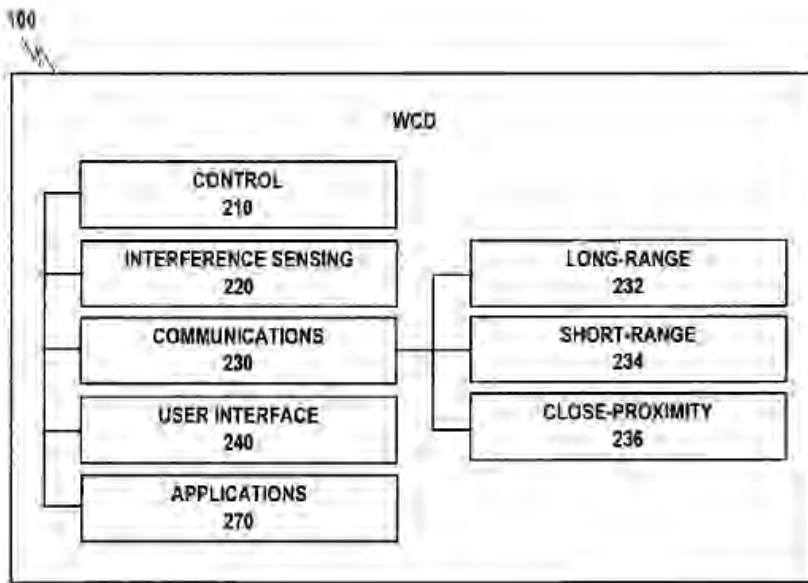
the Software-Defined Radio Module (SDR) 1102 of the '213 patent performs this function of any structure for doing so.

80. I was informed that WSOU has said that it has supplemented its initial proposed structure identified above with the following additional proposed structure indicated in red below:

Structure/material/acts: For example, apparatus A and process 4 of Fig. 13, apparatus 1102 and software modules 1110-1118 of Fig. 12, apparatus 1104 of Fig. 11, communications module 230 of Fig. 2, memory 330 and processor 300 of Figs. 3, 7A, 8A, 9A, or 11, software-defined radio module 1102 and software modules 1110-1118 of Fig. 12, and step 1418 of Fig. 14A, and the corresponding portions of the specification at 6:17-30, 17:34-44, 50:7:22, 8:60-9:5, 17:8-52, 18:4-60, 20:35-44, 21:1-3, and 21:43-48, and equivalents thereof.

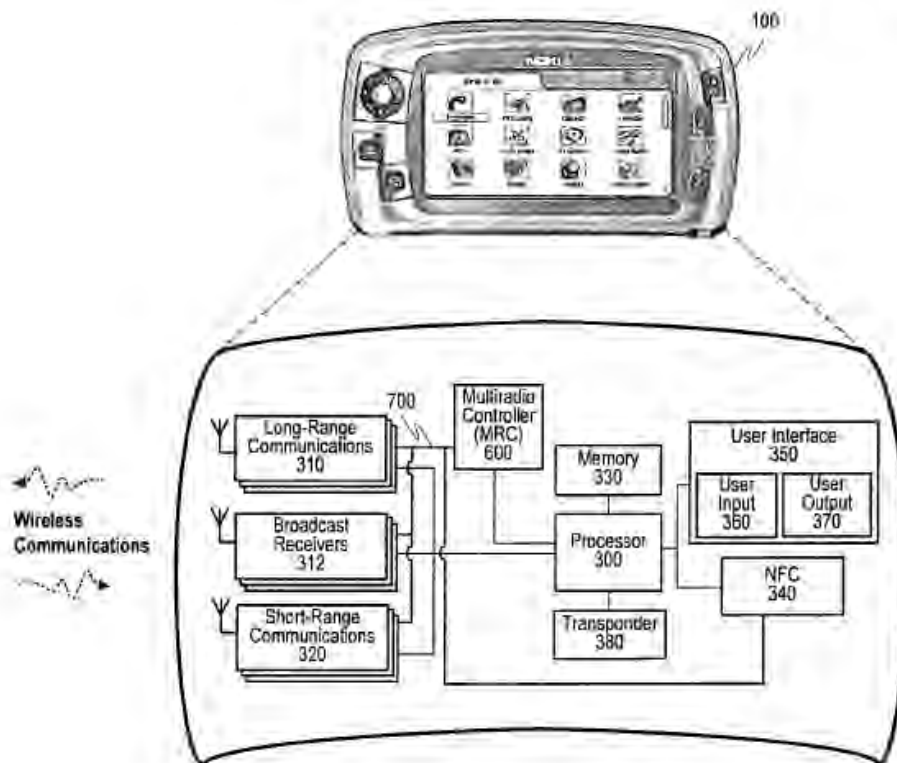
However, a POSITA would still find this claim term indefinite, because the specification does not clearly link this additional structure to performing the claimed function, and this structure is not sufficient to perform the claimed function. Although the term “formulate” (or some version thereof) appears in the '213 patent 20 times, it appears only once in the new disclosures, at 21:43-45: “The initiating apparatus may then formulate a configuration based on at least the remote characteristic information and the local characteristic information in step 1418.” As above, this passage discloses only that the “apparatus,” a generic, “black box” structure, “may then formulate a configuration.” This passage fails to identify any particular hardware, software, computer program code, algorithms, steps, instructions, or other structure for doing so. Figure 2, which WSOU also identifies and is shown below, similarly does not provide any detail or information about any structure that performs this “formulating a configuration” function.

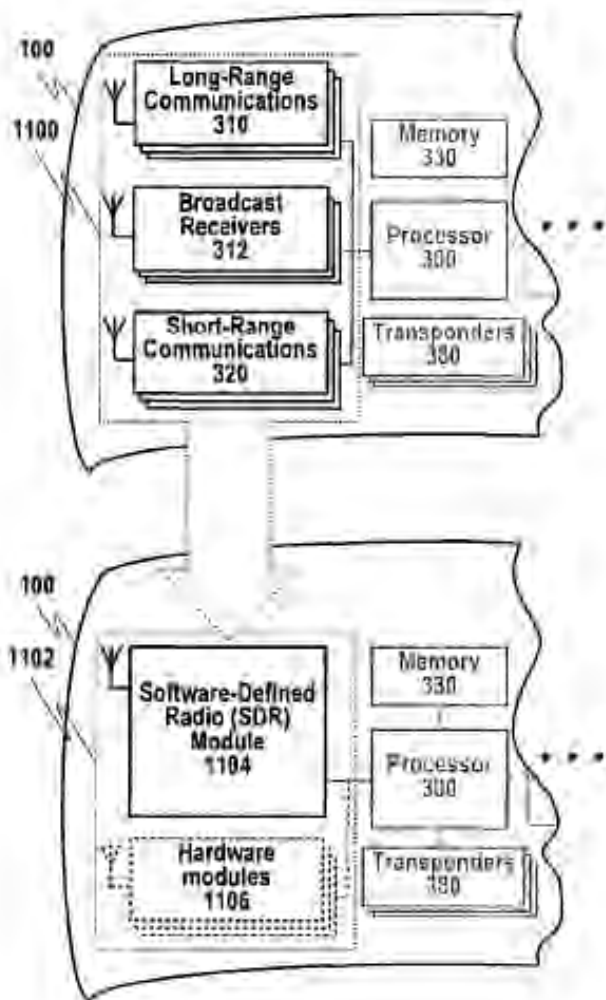


**FIG. 2**

As shown above, Figure 2 shows certain generic components as a “black box,” including communications module 230. But Figure 2 does not identify which components, if any, perform the “formulating a configuration” function, much less how they do so. Similarly, Figures 3, 7A (shown below), 8A, 9A, and 11 (also shown below), which WSOU also identifies, show certain generic components as a “black box,” including memory 330 and processor 300, but do not identify which components, if any, perform the “formulating a configuration in the apparatus” function or how.

**FIG. 7A**



**FIG. 11**

81. The lack of any corresponding structure for the function of “formulating a configuration in the apparatus” is particularly problematic due to the large number of communications protocols that are identified by the specification of the ’213 patent. The specification refers to at least five different “long-range” communications technologies, protocols, and standards including GSM, WCDMA, GPRS, PCS and WiMAX. ’213 patent at, e.g., Fig. 3 and 7:22–35. The specification also refers to at least three different “broadcast communications” technologies, protocols, and standards including analog radio, DVB, and DAB. ’213 patent at, e.g., Fig. 3. ’213 patent at, e.g., Fig. 3 and 7:36–47. The specification refers to another seven

different “short-range communications” technologies that include Bluetooth, WLAN, UWB, BT-ULP, Wireless USB, Zigbee, and UHF RFID. ’213 patent at, e.g., Fig. 3 and 7:48–59. The specification even refers to additional “close-proximity communications” technologies, protocols, and standards such as RFID, IR communication, QR bar code readers, microtaggants, ink based tag identification, and optical character recognition. ’213 patent at 7:60–8:11. A POSITA would understand that “formulating” a particular configuration for each of these technologies, protocols, and standards would be complex and can depend upon a large number of different factors. This is particularly so given the various different types of “remote characteristic information” and “local characteristic information” that the ’213 patent’s specification and claim 22 identifies as possibly being used to “formulate” a configuration. ’213 patent at 20:8–29 and 25:60–26:5. “Formulating” a configuration can also be done in many different ways, using different hardware, software, computer program code, algorithms, instructions, or other structure. However, when attempting to identify any corresponding structure for this function, the specification does not give any examples at all or disclose any corresponding structure for formulating a configuration for any of these communications and networking technologies, protocols, and standards, much less all of them. Without any guidance at all from the ’213 patent specification, a POSITA has no guidance and simply cannot ascertain what structure performs the function of “formulating a configuration in the apparatus,” particularly for these and any other communications and networking technologies, protocols, and standards. As a result, and as I already discussed, a POSITA would conclude that the claim term “means for formulating a configuration in the apparatus” lacks any sufficient, clearly-linked corresponding structure, and is therefore indefinite.

82. In summary, a POSITA would conclude that the term “means for formulating a configuration in the apparatus” from the received remote characteristic information and the

determined local characteristic information” is indefinite. A POSITA would not understand that any of the parts of the specification that WSOU has proposed to be clearly linked or sufficient to performing this function. Apparatus A as a whole is not sufficiently linked nor described for doing so, nor is any Software-Defined Radio (SDR) as described in the specification. The specification does not disclose that the SDR or its components perform this “formulating” function, or disclose sufficient structure to do so. Instead, the specification states that the configuration is formulated for the SDR, but does not identify any specific structure that performs this function.

83. I also understand that NEC asserts the similar claim term reciting “computer program code configured to formulate a configuration in the apparatus” does not identify specific structure for performing the recited function of “formulate a configuration in the apparatus.” Here, while the words “means for” are not used, the term “computer program configured to” would be recognized by a POSITA as a nonstructural nonce phrase. And, because the claim limitation is set forth in functional language without the identification of sufficient structure to perform the claimed function, I understand that the term is to be construed subject to 35 U.S.C. § 112, ¶ 6. I understand that NEC’s position is that this term is subject to 35 U.S.C. § 112, ¶ 6, but is indefinite because there is no specification structure that is clearly linked, sufficient to perform, or corresponds to this function. I agree with NEC that a POSITA would not find the claim language reciting “computer program code being configured to ...” to be specific structure, material, or acts for performing the claimed function. The claim merely suggests that computer code might be used to achieve the claimed function, but it does not identify any such computer code, or even the algorithm(s) that might be implemented using computer code. The claim’s general recitation of “computer program code” does not identify any specific algorithm, steps, instructions, method, or computer program code for performing the recited function. A POSITA would find this claim language to be a generic

recitation of a function to be performed by some unspecified computer program code. As a result, a POSITA would recognize that this “computer program code configured to ...” is to be construed under 35 U.S.C. § 112, ¶ 6. In other words, to understand this claim term, a POSITA would look to the specification for any corresponding, clearly-linked sufficient structure to achieve the claimed function. As discussed above, there is none and a POSITA would find that this term is indefinite. Specifically, the specification does not disclose any specific computer program code, algorithms, steps, or instructions for performing this function. As I have explained above for the similar “means for ...” term, the specification does not disclose any corresponding, clearly-linked, or sufficient computer program code (including any specific instructions, algorithms, or steps) that acts as “computer program code configured to formulate a configuration in the apparatus.” Also, WSOU’s proposed construction does not identify any specific computer program code (e.g., specific algorithms, methods, or instructions) for performing the claimed function. As a result, in light of the specification, a POSITA would find the claim term reciting “computer program code configured to formulate a configuration in the apparatus” does not reasonably inform a POSITA of what specific computer program code performs the recited, specific function. This claim term is therefore indefinite.

**(b) “means for implementing the configuration in the apparatus”  
and “computer program code configured to implement the  
configuration in the apparatus”**

<b>“Means for implementing the configuration in the apparatus” – ’213 Patent Claim 22</b>	
<b>“Computer program code configured to implement the configuration in the apparatus” – ’213 Patent Claim 8</b>	
<b>NEC’s Construction</b>	<b>WSOU’s Construction</b>
<i>Indefinite.</i>  “Means for ...” and “computer program code configured to ...” terms both governed by 35 U.S.C. § 112, ¶ 6.	<b><u>“Means for implementing ... apparatus”:</u></b> Governed by 35 U.S.C. § 112, ¶ 6. This term is not indefinite.

<p><u>Function:</u> [implementing / to implement] the configuration in the apparatus.</p> <p><u>Structure/material/acts:</u> <i>No sufficient structure disclosed or clearly-linked; no specific hardware, software, program, algorithm, or steps.</i></p>	<p><u>Function:</u> implementing the configuration in the apparatus.</p> <p><u>Structure/material/acts:</u> For example, apparatus A and process 6 of Fig. 13, apparatus 1102 of Fig. 12, apparatus 1104 of Fig. 11, <u>communications module 230 of Fig. 2, memory 330 and processor 300 of Figs. 3, 7A, 8A, 9A, or 11, software-defined radio module 1102 and software modules 1110-1118 of Fig. 12,</u> and the corresponding portions of the specification at <u>6:17-30, 6:50-7:22, 8:60- 9:5, 17:834-4452, 18:4-60, 20:49-53, 21:1-3, and 21:52-56,</u> and equivalents thereof.</p> <p><b><u>“Computer program code configured to implement ... apparatus”:</u></b> Not governed by 35 U.S.C. § 112, ¶ 6. This term is not indefinite. No construction necessary – plain and ordinary meaning.</p> <p><u>To the extent, however, that the Court treats the term as means-plus-function, the function and structure identified above (except that “processor 300” and “software-defined radio module 1102” were not identified for this term, and “step 1422 of Fig. 14A” was identified, and only 18:4-6 and 18:45-60 were identified (instead of 18:4-60)).</u></p>
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84. My understanding is that NEC and WSOU agree that of these related terms, the term “means for implementing the configuration in the apparatus” is a means plus function term subject to 35 U.S.C. § 112, ¶ 6. This requires an analysis of what a POSITA would identify is the specified function from the claims, as well as the corresponding structure for performing that function from the specification. My understanding is that NEC and WSOU agree that the specific function is “implementing the configuration in the apparatus.” However, my understanding is that NEC’s position is that there is no sufficient corresponding, clearly-linked structure, material, or

acts for performing this function, and that it is therefore indefinite. WSOU, on the other hand, had initially proposed that the corresponding specification structure is:

For example, apparatus A and process 6 of Fig. 13, apparatus 1102 of Fig. 12, apparatus 1104 of Fig. 11, and the corresponding portions of the specification at 17:34-44, 18:4-6, and 20:49-53, and equivalents thereof.

As I explain below, a POSITA would not find that this portion of the specification identified by WSOU is clearly linked, sufficient structure for performing the specified function. As a result, a POSITA would find this “means for ...” term to be indefinite.

85. Because NEC and WSOU agree that this “means for ...” term is subject to 35 U.S.C. § 112, ¶ 6, I have looked to the specification to see if it clearly links any corresponding, sufficient structure for performing the recited function of “implementing the configuration in the apparatus.” The specification does not recite any corresponding, sufficient, or clearly linked structure for performing this function. A POSITA would understand that “implementing the configuration in the apparatus” is a specific type of function in which the configuration that is received is actually applied in the apparatus. However, the specification does not identify any structure of an apparatus that performs this implementation of the configuration. A POSITA would not understand the specification to disclose, much less clearly link, any particular structure for performing the function of “implementing the configuration in the apparatus.” Because the specification does not disclose or clearly link sufficient structure for performing this specific function, a POSITA would find that the claim term “means for implementing the configuration in the apparatus” is indefinite.

86. This indefiniteness is further confirmed by WSOU’s proposed construction of the corresponding structure. As noted above, WSOU initially proposed the following as corresponding structure:

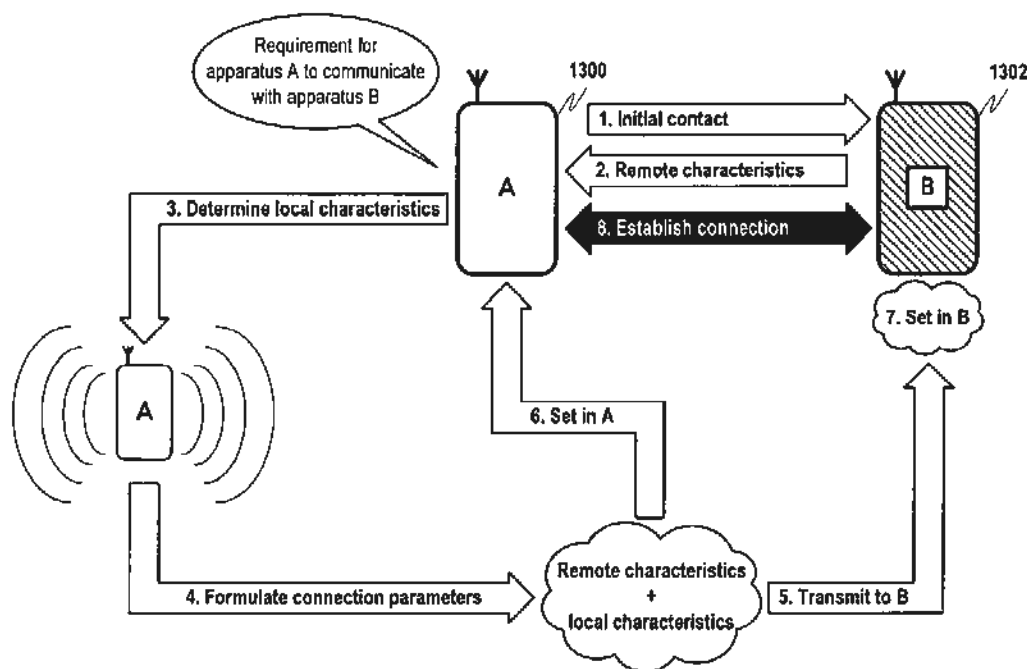


For example, apparatus A and process 6 of Fig. 13, apparatus 1102 of Fig. 12, apparatus 1104 of Fig. 11, and the corresponding portions of the specification at 17:34-44, 18:4-6, and 20:49-53, and equivalents thereof.

The specification does not clearly link this structure to performing the claimed function, and this structure is not sufficient to perform the claimed function. In Fig. 13, “Apparatus A” is drawn as a rectangle with the letter “A” in the center. There is no explanation of what happens inside of the box labeled “A,” and there is no discussion about what feature, code, algorithm, or portion of “A” might implement the configuration and how it might do so. Box “A” does not provide corresponding *structure* to perform the specific function of “implementing the configuration in the apparatus.” Further, the preamble of the claim language already states that the “apparatus” comprises “means for implementing the configuration in the apparatus.” WSOU’s proposed identification of box “A” as corresponding structure is merely redundant of the functional claim language used, i.e., an apparatus for implementing the configuration in the apparatus. A POSITA would not understand box “A” to be clearly linked structure for performing this “implementing the configuration in the apparatus” function. Indeed, a POSITA would not find box “A” to provide *structure*. It is instead a graphical placeholder for structure that the patent never identifies. As a result, the specification’s “Apparatus A” is not sufficient to perform the claimed function, because there is no disclosure of the required hardware, software, algorithms, steps, computer program code, instructions, or other structure of Apparatus A that is sufficient to perform this claimed function. WSOU’s proposed corresponding structure also identifies “the corresponding portions of the specification at ... 20:49-53.” That portion of the specification is shown below, with emphasis added:

Apparatus A 1300 and apparatus B 1302 may then set the configuration. Setting a configuration may include, for example, programming one or more SDR modules 1102 in each apparatus for establishing communication in accordance with the configuration.

A POSITA would understand this portion of the specification to merely state that the apparatus sets the configuration, such as doing so in an SDR. Notably, this configuration is for “one or more SDR modules 1102.” As a result, a POSITA would understand that it is not SDR module 1102 that, itself, performs the “implementing” function. Instead, it is some other structure not disclosed that performs this programming to configure the SDR module. This part of the specification does not disclose what hardware, software, algorithms, steps, computer program code, instructions, or other structure actually performs the implementation of the configuration, or how to do so. WSOU’s proposal also identifies Figure 13 and its process labeled “6. Set in A,” which are shown below. However, Figure 13, reproduced below, is similarly high-level and fails to provide any meaningful structural detail for what actually happens inside of box “A.”



WSOU’s proposal is incorrect because it appears to identify the entirety of Figure 13. At most, it is only the portion “6. Set in A” that a POSITA might look to in seeking to understand how the inventors proposed to “implement[] the configuration in the apparatus.” But, as already discussed,

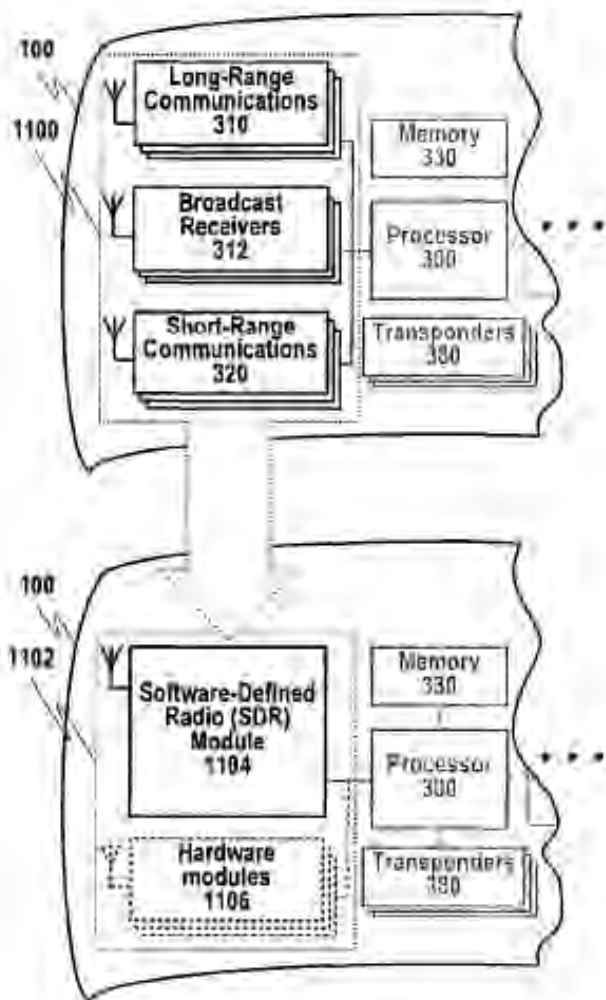
Figure 13 and the portion labeled “6. Set in A” described at ’213 patent at 20:49–53 fail to disclose any particular or detailed structure for the specific “implementation” function. In summary, Figure 13 and the description of its “6. Set in A” do not disclose any specific hardware, software, algorithms, steps, computer program code, instructions, or other structure that performs this function which is sufficient, or clearly link any such structure to the function of “implementing the configuration in the apparatus.” For all of these reasons, a POSITA would not understand Figure 13, and the corresponding portions of the specification at 20:49–53, to disclose corresponding, clearly-linked, sufficient structure for performing the claimed function.

87. WSOU’s proposed construction also identifies “Software-Defined Radio (SDR) module” 1102 of Fig. 12 and 1104 of Fig. 11 (which WSOU again tellingly renames as “apparatus 1102” and “apparatus 1104” in its proposal), along with “the corresponding portions of the specification at 17:34-44 [and] 18:4-6.” Neither of these portions of the specification or Figures 11 and 12 provides sufficient or clearly-linked corresponding function for the claimed function of “implementing the configuration in the apparatus.” As an initial matter, as discussed in the preceding paragraph, the specification discloses that something else programs the SDR in order to set it to apply the configuration. ’213 patent at 20:49–53. As a result, a POSITA would not understand the SDR module to be the corresponding structure that performs the function of “implementing the configuration in the apparatus.” Looking to the two other specification citations by WSOU, ’213 patent at 17:34-44 is shown below:

For example, an alternative communication configuration for WCD 100 is shown at 1102. In this example, the apparatus may incorporate at least one SDR module 1104 in lieu of one or more discrete hardware-based radio modules. While the flexibility of SDR module 1104 may provide an option of omitting some communication hardware from WCD 100, this does not preclude the incorporation of one or more hardware based modules 1106. Implementations incorporating both SDR radio modules 1104 and

hardware-based modules 1106 (represented as optional in FIG. 11 through the use of dotted lines) are possible.

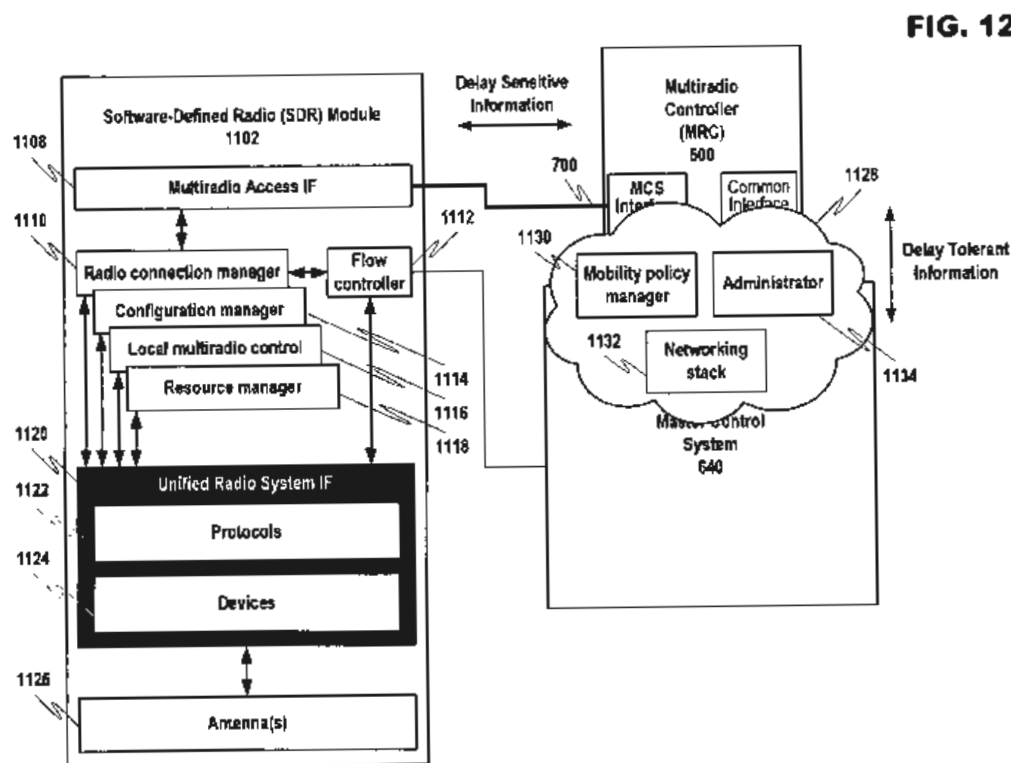
None of the above portion of the specification mentions “implementing” a configuration or otherwise applying configuration settings that were previously formulated by the apparatus. In fact, the words “implementing” and “configuration” are not mentioned in this passage. There is no description of how to implement a configuration, or what hardware, software, computer program code, algorithms, steps, instructions, or other structure does so. There is not even any example of how to do so using an example of configuration settings that have been formulated by the apparatus, or doing so for one of the wireless communication protocols disclosed. At most, this passage only states that some embodiments of the invention may include a so-called software defined radio (SDR), which has some “flexibility” enabling the emulation of certain traditionally protocol-specific hardware. A POSITA would not understand this part of the specification to understand that the SDR performs the claimed implementing function. Figure 11, which WSOU also identifies and is shown below, similarly does not provide any detail or information about any structure that performs this “implementing” function.

**FIG. 11**

As shown above, Figure 11 shows certain generic components as a “black box,” including Software-Defined Radio (SDR) Module 1104 and other components. But Figure 11 does not identify which components, if any, perform the “implementing” function or otherwise sets configuration information that has been formulated, much less how they do so. The second portion of the specification identified by WSOU, ’213 patent at 18:4–6, is shown below.

FIG. 12 explains an example of a possible implementation of a SDR 1102 utilizing a previously disclosed embodiment of the present invention.

This single sentence says nothing about “implementing” a configuration that has been formulated by the apparatus. All it says to a POSITA is the apparatus may have a Software-Defined Radio (SDR) 1102. A POSITA would not understand that this one sentence discloses or clearly links sufficient structure to performing the specific function of “implementing the configuration in the apparatus.” Further, Figure 12 and its disclosure of SDR 1102, reproduced below, similarly do not disclose that SDR 1102 performs this “implementing” function, much less any hardware, software, algorithms, steps, computer program code, instructions, or other structure for doing so.



As shown above, the example of Software-Defined Radio Module 1102 in Figure 12 has a Multiradio Access IF 1108, certain “manager” modules 1110, a “flow controller” 1112, a “Unified Radio System IF” 1120 having Protocols 1122 and Devices 1124, and one or more Antennas 1126. None of these sub-components is disclosed or linked by the specification to “implementing the configuration in the apparatus.” See ’213 patent at 18:9–60 (describing these components). For

instance, while Figure 12 includes a “configuration manager” 1114, the specification discloses only that configuration manager 1114 “may provide information regarding resources required for supporting a particular wireless transport,” not that it “implement[s]” a configuration in the apparatus. ’213 patent at 18:29–33. A POSITA would not understand from the specification that SDR 1102 of Figure 12 performs this “implementing” function, or that the SDR has sufficient structure to do so for the different examples and embodiments disclosed.

88. I further observe that it is not inherent or required for a software-defined radio to implement a configuration. Software-defined radios predate and are prior art to the ’213 patent. In general, a software-defined radio is a communication system whose overall function may be defined in software. This is as opposed to minor configuration selections such as choosing a radio station on an RF radio. Rather in a software-defined radio the overall function of the system may be redefined in software. For example via software the radio may be redefined to be a Wi-Fi system, then a cellular system, and then a Bluetooth system. I further note that this concept of software defined radio is particularly applicable to the physical layer where radios were historically defined to perform a single function such as FM radio without the possibility of redefining the system to act like GPS specifically because the physical layer was optimized to implement a specific type of communication system and software could not override the physical design of the circuitry. However, in a software defined radio even these physical layer functions may be overridden to defined totally new functionality of the radio such as switching from Bluetooth to GPS. Nothing requires a software-defined radio to implement configurations, or to do so using configurations that have been “formulated” from either received remote characteristic information of received local characteristic information as claimed by the claims. As a result, a POSITA would not understand a software-defined radio to perform the “implementing” function, and as I have

already explained, the specification does not disclose that the Software-Defined Radio Module (SDR) 1102 of the '213 patent performs this function of any structure for doing so.

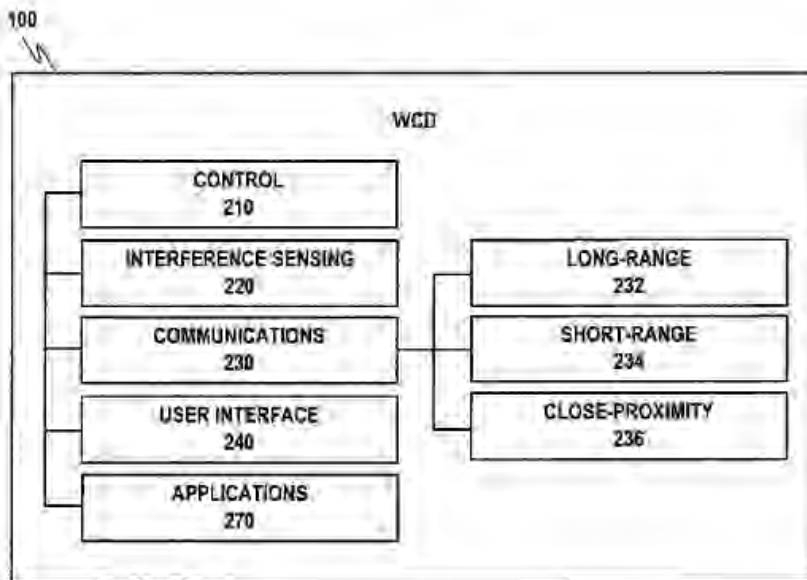
89. I was informed that WSOU has said that it has supplemented its initial proposed structure identified above with the following additional proposed structure indicated in red below:

Structure/material/acts: For example, apparatus A and process 6 of Fig. 13, apparatus 1102 of Fig. 12, apparatus 1104 of Fig. 11, communications module 230 of Fig. 2, memory 330 and processor 300 of Figs. 3, 7A, 8A, 9A, or 11, software-defined radio module 1102 and software modules 1110-1118 of Fig. 12, and the corresponding portions of the specification at 6:17-30, 6:50-7:22, 8:60- 9:5, 17:834-4452, 18:4-60, 20:49-53, 21:1-3, and 21:52-56, and equivalents thereof.

However, a POSITA would still find this claim term indefinite, because the specification does not clearly link this additional structure to performing the claimed function, and this structure is not sufficient to perform the claimed function of “implementing the configuration in the apparatus.” Although the term “implement” appears in the '213 patent 44 times, the new disclosures reference implementing a configuration in only one passage, at 18:4-60. Specifically, this passage discloses that “[i]f radio connection manager 1110 decides that it is possible to configure *SDR 1102* to support the particular wireless transport (e.g., in view of the information provided by the other modules) then local multiradio control 1116 may implement the configuration.” '213 patent at 18:33-37. This passage does not disclose that local multiradio control 1116 implements a configuration *in the apparatus*; it discloses only that local multiradio control 1116 implements the configuration in SDR 1102. Additionally, the phrase “may implement the configuration” only repeats the language of the claim term; it does not disclose how a configuration is “implemented,” nor does it disclose any structure or algorithm for doing so. Rather, Fig. 12 depicts local multiradio control 1116 only as a generic, “black box” component. Finally, this passage does not disclose that the “configuration” referenced here was *received from a different apparatus*, or that the

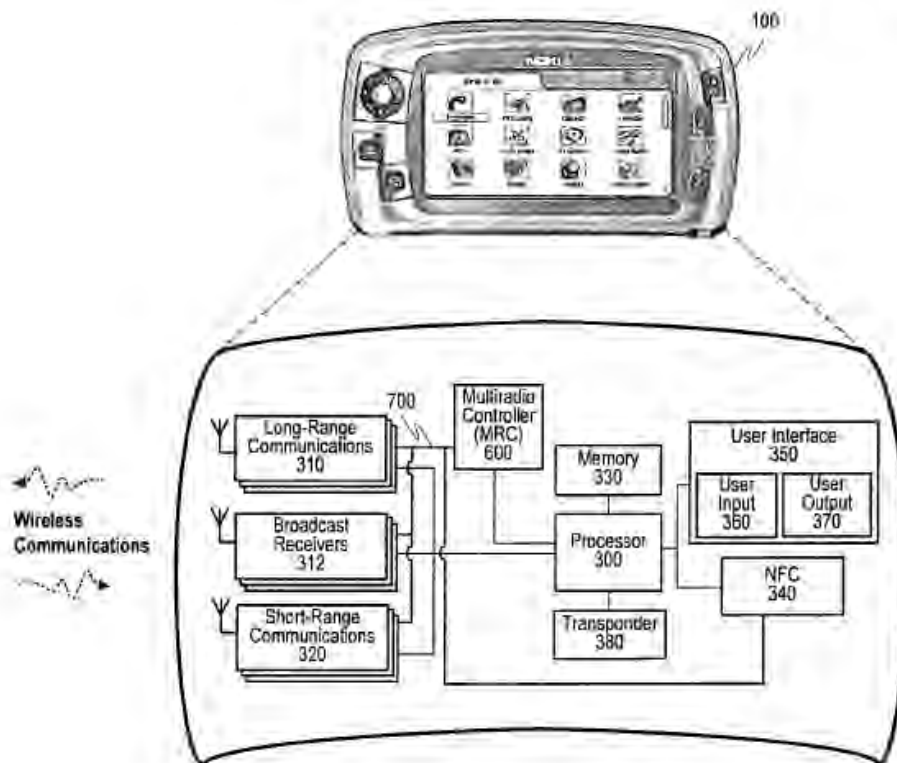


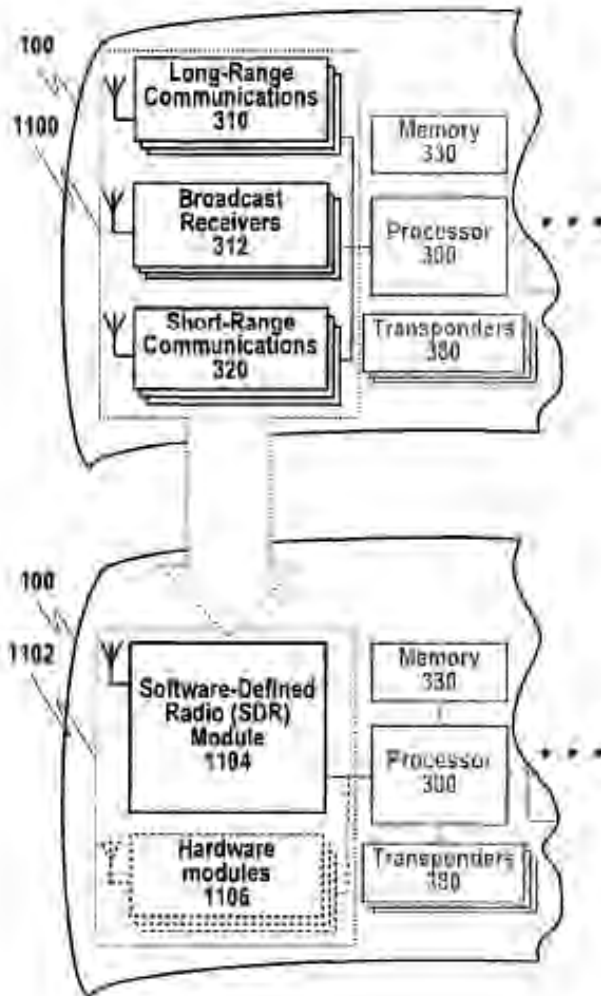
configuration was formulated *based on local and remote characteristic information*. In other words, the “configuration” of this passage is for implementing a configuration in SDR 1102, not for implementing a configuration in the apparatus as the claim language requires. For these reasons, a POSITA would not find that the additional passages WSOU cites from the specification disclose any clearly linked structure that performs the “implementing the configuration” function. Figure 2, which WSOU also identifies and is shown below, similarly does not provide any detail or information about any structure that performs this “implementing the configuration” function.

**FIG. 2**

As shown above, Figure 2 shows certain generic components as a “black box,” including communications module 230. But Figure 2 does not identify which components, if any, perform the “implementing the configuration” function, much less how they do so. Similarly, Figures 3, 7A (shown below), 8A, 9A, and 11 (also shown below), which WSOU also identifies, show certain generic components as a “black box,” including memory 330 and processor 300, but do not identify which components, if any, perform the “implementing the configuration” function or how.

**FIG. 7A**



**FIG. 11**

90. The lack of any corresponding structure for the function of “implementing the configuration in the apparatus” is particularly problematic due to the large number of communications protocols that are identified by the specification of the ’213 patent. As I have already discussed, the specification refers to at least five different “long-range” communications technologies, protocols, and standards including GSM, WCDMA, GPRS, PCS and WiMax. ’213 patent at, e.g., Fig. 3 and 7:22–35. The specification also refers to at least three different “broadcast communications” technologies, protocols, and standards including analog radio, DVB, and DAB. ’213 patent at, e.g., Fig. 3. ’213 patent at, e.g., Fig. 3 and 7:36–47. The specification refers to

another seven different “short-range communications” technologies that include Bluetooth, WLAN, UWB, BT-ULP, Wireless USB, Zigbee, and UHF RFID. ’213 patent at, e.g., Fig. 3 and 7:48–59. The specification even refers to additional “close-proximity communications” technologies, protocols, and standards such as RFID, IR communication, QR bar code readers, microtaggants, ink based tag identification, and optical character recognition. ’213 patent at 7:60–8:11. A POSITA would understand that “implementing” the configuration that has been determined for each one of these communications and networking technologies, protocols, and standards, in order to then communicate using them, would be complex and can be done in many different ways and dependent upon many different factors. Doing so also requires a large amount of information and settings in order for the two apparatuses to implement the configuration in the apparatus in order to then establish communications between the apparatuses. Once again, this is particularly so given the various different types of “remote characteristic information” and “local characteristic information” that the ’213 patent’s specification and claim 22 identifies as possibly being used to formulate a configuration, which is then “implemented” by each apparatus according to this function. ’213 patent at 20:8–29 and 25:60–26:5. “Implementing” a configuration can also be done in many different ways, using different hardware, software, computer program code, algorithms, instructions, or other structure. However, when attempting to identify any corresponding structure for this function, the specification does not give any examples at all or disclose any corresponding structure for implementing a configuration applicable to any of these communications and networking technologies, protocols, and standards, much less all of them. Without any guidance at all from the ’213 patent specification, a POSITA has no guidance and simply cannot ascertain what structure performs the function of “implementing the configuration in the apparatus,” particularly for these and any other communications and networking

technologies, protocols, and standards. As a result, and as I already discussed, a POSITA would conclude that the claim term “means for implementing the configuration in the apparatus” lacks any sufficient, clearly-linked corresponding structure, and is therefore indefinite.

91. In summary, a POSITA would conclude that the term “means for implementing the configuration in the apparatus” is indefinite. A POSITA would not understand that any of the parts of the specification that WSOU has proposed to be clearly linked or sufficient to performing this function. Apparatus A as a whole is not correct structure for doing so, nor is any Software-Defined Radio (SDR) as described in the specification. The specification does not disclose that the SDR or its components perform this “implementing” function, or disclose sufficient structure to do so.

92. I also understand that NEC asserts the similar claim term reciting “computer program code configured to implement the configuration in the apparatus” does not identify specific structure for performing the recited function of “implement the configuration in the apparatus.” Here, while the words “means for” are not used, the term “computer program code configured to” would be recognized by a POSITA as a nonstructural nonce word. And, because the claim limitation is set forth in functional language without the identification of sufficient structure to perform the claimed function, I understand that the term is to be construed subject to 35 U.S.C. § 112, ¶ 6. I understand that NEC’s position is that this term is subject to 35 U.S.C. § 112, ¶ 6, but is indefinite because there is no specification structure that is clearly linked, sufficient to perform, or corresponds to this function. I agree with NEC that a POSITA would not find the claim language reciting “computer program code being configured to ...” to be specific structure, material, or acts for performing the claimed function. The claim merely suggests that computer code might be used to achieve the claimed function, but it does not identify any such computer code, or even the algorithm(s) that might be implemented using computer code. The

claim's general recitation of "computer program code" does not identify any specific algorithm, steps, instructions, method, or computer program code for performing the recited function. A POSITA would find this claim language to be a generic recitation of a function to be performed by some unspecified computer program code. As a result, a POSITA would recognize that this "computer program code configured to ..." is to be construed under 35 U.S.C. § 112, ¶ 6. In other words, to understand this claim term, a POSITA would look to the specification for any corresponding, clearly-linked sufficient structure to achieve the claimed function. As discussed above, there is none and a POSITA would find that this term is indefinite. Specifically, the specification does not disclose any specific computer program code, algorithms, steps, or instructions for performing this function. As I have explained above for the similar "means for ..." term, the specification does not disclose any corresponding, clearly-linked, or sufficient computer program code (including any specific instructions, algorithms, or steps) that acts as "computer program code configured to implement the configuration in the apparatus." Also, WSOU's proposed construction does not identify any specific computer program code (e.g., specific algorithms, methods, or instructions) for performing the claimed function. As a result, in light of the specification, a POSITA would find the claim term reciting "computer program code configured to implement the configuration in the apparatus" does not reasonably inform a POSITA of what specific computer program code performs the recited, specific function. This claim term is therefore indefinite.

- (c) **"means for establishing communication between the apparatus and at least one other apparatus in accordance with the configuration" and "computer program code configured to establish communication between the apparatus and at least one other apparatus in accordance with the configuration"**

**"Means for establishing communication between the apparatus and at least one other apparatus in accordance with the configuration" – '213 Patent Claim 22**

<p><b>“Computer program code configured to establish communication between the apparatus and at least one other apparatus in accordance with the configuration” – ’213 Patent Claim 8</b></p>	
NEC’s Construction	WSOU’s Construction
<p><i>Indefinite.</i></p> <p>“Means for ...” and “computer program code configured to ...” terms both governed by 35 U.S.C. § 112, ¶ 6.</p> <p><u>Function</u>: [establishing / to establish] communication between the apparatus and at least one other apparatus in accordance with the configuration.</p> <p><u>Structure/material/acts</u>: <i>No sufficient structure disclosed or clearly-linked; no specific hardware, software, program, algorithm, or steps.</i></p>	<p><b><u>“Means for establishing ... with the configuration”</u></b>: Governed by 35 U.S.C. § 112, ¶ 6. This term is not indefinite.</p> <p><u>Function</u>: establishing communication between the apparatus and at least one other apparatus in accordance with the configuration.</p> <p><u>Structure/material/acts</u>: For example, apparatus A and process 8 of Fig. 13, apparatus B of Fig. 13, <u>communications module 230 of Fig. 2, memory 330 and processor 300 of Figs. 3, 7A, 8A, 9A, or 11, software-defined radio module 1102 and software modules 1110-1118 of Fig. 12, and step 1424 of Fig. 14A, and the corresponding portions of the specification at 6:17-30, 6:50-7:22, 8:60-9:5, 17:8-52, 18:4-60, 20:53-56, 21:1-3, and 21:52-56, and equivalents thereof.</u></p> <p><b><u>“Computer program code configured to establish ... with the configuration”</u></b>: Not governed by 35 U.S.C. § 112, ¶ 6. This term is not indefinite. No construction necessary – plain and ordinary meaning.</p> <p><u>To the extent, however, that the Court treats the term as means-plus-function, the function and structure identified above (except that “processor 300” and “software-defined radio module 1102” were not identified for this term, and only 18:4-6 and 18:45-60 were identified (instead of 18:4-60)).</u></p>

93. My understanding is that NEC and WSOU agree that of these related terms, the term “means for establishing communication between the apparatus and at least one other

apparatus in accordance with the configuration” is a means plus function term subject to 35 U.S.C. § 112, ¶ 6. This requires an analysis of what a POSITA would identify is the specified function from the claims, as well as the corresponding structure for performing that function from the specification. My understanding is that NEC and WSOU agree that the specific function is “establishing communication between the apparatus and at least one other apparatus in accordance with the configuration.” However, my understanding is that NEC’s position is that there is no sufficient corresponding, clearly-linked structure, material, or acts for performing this function, and that it is therefore indefinite. WSOU, on the other hand, had initially proposed that the corresponding specification structure is:

For example, apparatus A and process 8 of Fig. 13, apparatus B of Fig. 13, and the corresponding portions of the specification at 20:53-56, and equivalents thereof.

As I explain below, a POSITA would not find that this portion of the specification identified by WSOU is clearly linked, sufficient structure for performing the specified function. As a result, a POSITA would find this “means for ...” term to be indefinite.

94. Because NEC and WSOU agree that this “means for ...” term is subject to 35 U.S.C. § 112, ¶ 6, I have looked to the specification to see if it clearly links any corresponding, sufficient structure for performing the recited function of “establishing communication between the apparatus and at least one other apparatus in accordance with the configuration.” The specification does not recite any corresponding, sufficient, or clearly linked structure for performing this function. A POSITA would understand that “establishing communication between the apparatus and at least one other apparatus in accordance with the configuration” is a more specific type of function for establishing effective communications between the two apparatuses. This could include, for example, sending an association request, receiving an association response, authenticating the identity of each apparatus or the users thereof, and performing certain security



procedures. Establishing communication may also involve assignment of resource such as a frequency channel for the communication (FDM), time slots (TDMA), or a spreading code or hopping sequence (spread spectrum). However, the specification does not identify any structure of an apparatus that performs this function of establishing communications based upon the configuration that was formulated, as well as sent to the other apparatus. The specification itself does not identify any specific structure for doing so from another device into the apparatus. Instead, the specification at most discloses generally that the apparatus will perform the function of establishing communications based on a configuration. This is discussed, for example, at '213 patent at 20:53–56, which states:

After the configuration is set in apparatus A 1300 and apparatus B 1302, either apparatus may initiate communication (e.g., establish a wireless link between apparatuses).

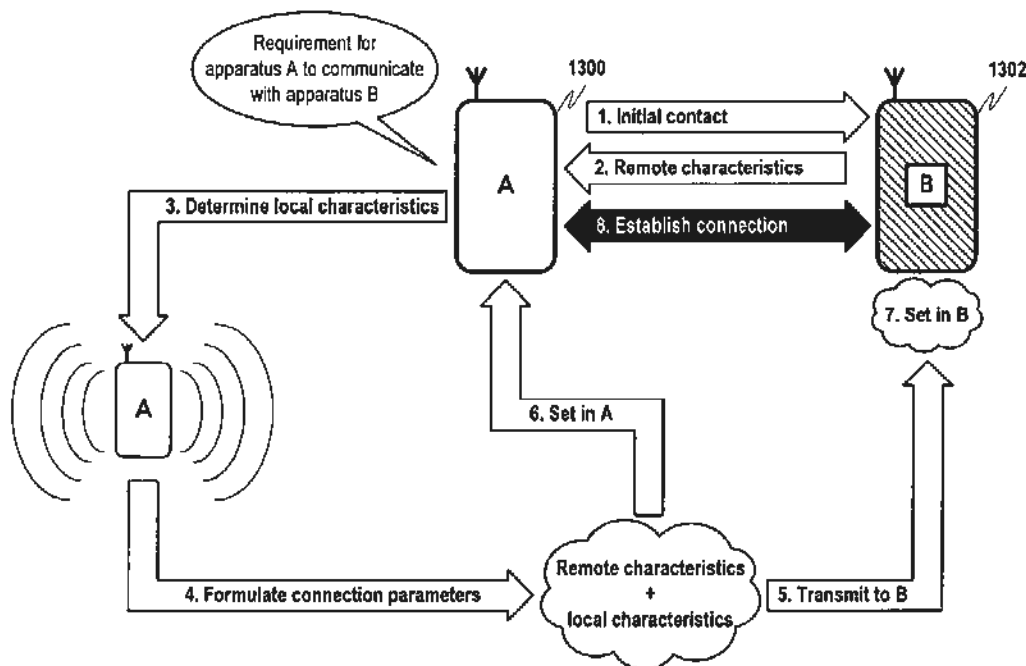
A POSITA would not understand this portion of the specification to disclose, much less clearly link, any particular structure for performing the function of “establishing communication between the apparatus and at least one other apparatus in accordance with the configuration.” Other portions of the specification similarly fail to identify any sufficient, clearly-linked structure for performing this establishing function, instead stating only that communications between the apparatuses is established once each apparatus has set the configuration. See '213 patent at 19:49–52, 19:58–61, and 19:64–66. Because the specification does not disclose or clearly link sufficient structure for performing this specific function, a POSITA would find that the claim term “means for establishing communication between the apparatus and at least one other apparatus in accordance with the configuration” is indefinite.

95. This indefiniteness is further confirmed by WSOU’s proposed construction of the corresponding structure. As noted above, WSOU initially proposed the following as corresponding structure:

For example, apparatus A and process 8 of Fig. 13, apparatus B of Fig. 13, and the corresponding portions of the specification at 20:53-56, and equivalents thereof.

The specification does not clearly link this structure to performing the claimed function, and this structure is not sufficient to perform the claimed function. In Fig. 13, “Apparatus A” is drawn as a rectangle with the letter “A” in the center. There is no explanation of what happens inside of the box labeled “A,” and there is no discussion about what feature, code, algorithm, or portion of “A” might initiate an inquiry and how it might do so. Box “A” does not provide corresponding *structure* to perform the specific function of “establishing communication between the apparatus and at least one other apparatus in accordance with the configuration.” Further, the preamble of the claim language already states that the “apparatus” comprises this “means for establishing communication between the apparatus and at least one other apparatus in accordance with the configuration.” WSOU’s proposed identification of box “A” as corresponding structure is merely redundant of the functional claim language used, i.e., an apparatus for establishing communication between the apparatus and at least one other apparatus in accordance with the configuration. A POSITA would not understand box “A” to be clearly linked structure for performing this “establishing communication” function. Indeed, a POSITA would not find box “A” to provide *structure*. It is instead a graphical placeholder for structure that the patent never identifies. As a result, the specification’s “Apparatus A” is not sufficient to perform the claimed function, because there is no disclosure of the required hardware, software, algorithms, steps, computer program code, instructions, or other structure of Apparatus A that is sufficient to perform this claimed function. WSOU’s proposed corresponding structure also identifies “process 8 of Fig. 13, and the corresponding portions of the specification at 20:53-56.” Figure 13, reproduced below, is high-level and fails to provide any meaningful structural detail for what actually happens inside of box “A.” Process 8 only discloses the words “establish connection” with a bidirectional arrow between

Apparatus A and Apparatus B. This merely indicates that communications are established between these apparatuses. However, this figure and the words “8. Establish connection” do not disclose any specific structure, hardware, software, algorithms, steps, computer program code, or instructions for performing this function. Instead, a POSITA would understand Figure 13 to simply be disclosing a functional description that a connection is established between Apparatus A and Apparatus B.



WSOU’s proposal also is incorrect because it appears to identify the entirety of Figure 13. At most, it is only the portion “8. Establish connection” that a POSITA might look to in seeking to understand how the inventors proposed to “establish[] communication between the apparatus and at least one other apparatus in accordance with the configuration.” But, as already discussed, Figure 13 and the portion labeled “8. Establish communication” fail to disclose any particular or detailed structure for performing this specific function. WSOU’s proposed construction also identifies the ’213 patent at 20:53-56. This is the portion of the specification I already discussed in the immediately preceding paragraph, which only states:

After the configuration is set in apparatus A 1300 and apparatus B 1302, either apparatus may initiate communication (e.g., establish a wireless link between apparatuses).

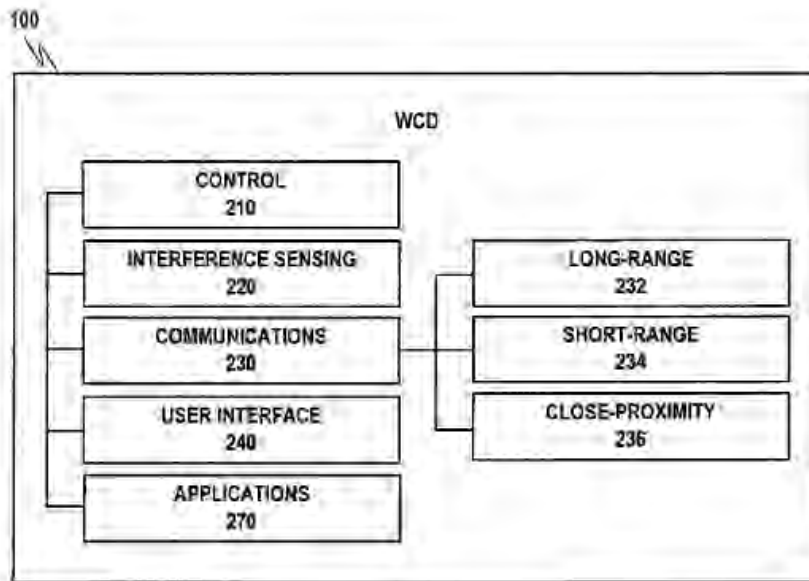
As just explained, none of this single sentence identifies any structure by which Apparatus A and Apparatus B establish communications between each other based upon the configuration that has been implemented. This sentence also does not disclose any structure sufficient for actually establishing communications between Apparatus A and Apparatus B based upon the set configuration. In summary, the passage that WSOU points to in its proposed construction does not disclose any specific hardware, software, algorithms, steps, computer program code, instructions, or other structure that performs this function which is sufficient, or clearly link any such structure to the function of “establishing communication between the apparatus and at least one other apparatus in accordance with the configuration.” For all of these reasons, a POSITA would not understand Figure 13, and the corresponding portions of the specification at 20:53-56, to disclose corresponding, clearly-linked, sufficient structure for performing the claimed function. Because there is no corresponding, clearly-linked, sufficient structure to “establish[] communication between the apparatus and at least one other apparatus in accordance with the configuration,” a POSITA would conclude that the claim term “means for establishing communication between the apparatus and at least one other apparatus in accordance with the configuration” is indefinite.

96. I was informed that WSOU has said that it has supplemented its initial proposed structure identified above with the following additional proposed structure indicated in red below:

Structure/material/acts: For example, apparatus A and process 8 of Fig. 13, apparatus B of Fig. 13, **communications module 230 of Fig. 2, memory 330 and processor 300 of Figs. 3, 7A, 8A, 9A, or 11, software-defined radio module 1102 and software modules 1110-1118 of Fig. 12, and step 1424 of Fig. 14A,** and the corresponding portions of the specification at **6:17-30, 6:50-7:22, 8:60-9:5, 17:8-**

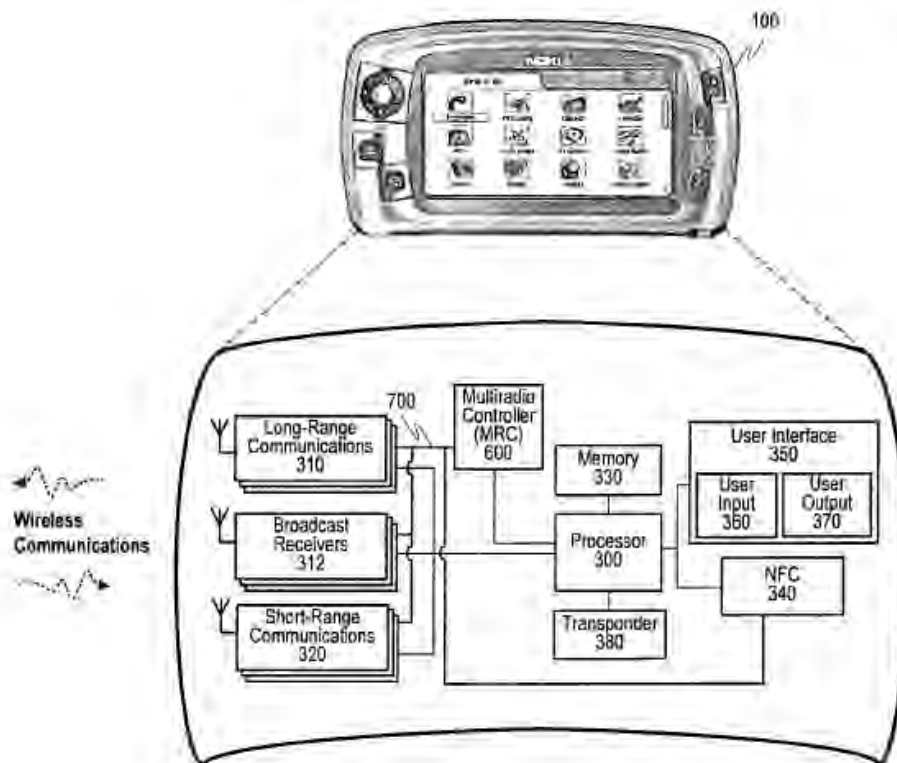
52, 18:4-60, 20:53-56, 21:1-3, and 21:52-56, and equivalents thereof.

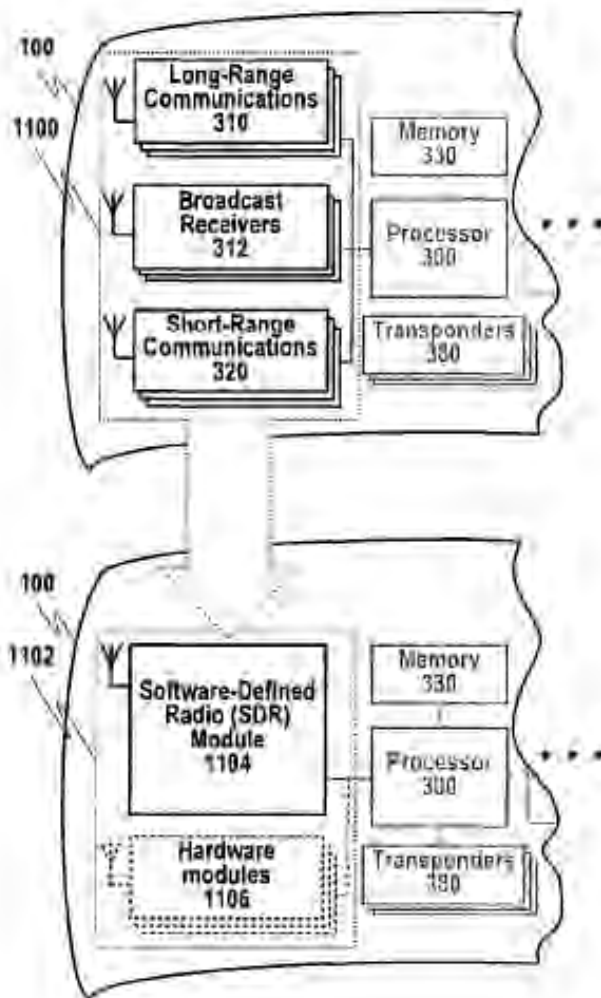
However, a POSITA would still find this claim term indefinite, because the specification does not clearly link this additional structure to performing the claimed function, and this structure is not sufficient to perform the claimed function. Only one passage of new disclosures references “communication in accordance with the configuration,” at 21:52-56: “For example, the configuration may be set in the initiating apparatus (step 1422) by ceasing interaction with the other apparatus on the initialization channel, and then programming one or more SDR modules 1102 to communicate in accordance with the configuration.” This passage, however, fails to disclose any hardware, software, computer program code, algorithms, steps, instructions, or other structure that actually “establishes” communication between the apparatus and the at least one other apparatus. Figure 2, which WSOU also identifies and is shown below, similarly does not provide any detail or information about any structure that performs this “establishing communication” function.

**FIG. 2**

As shown above, Figure 2 shows certain generic components as a “black box,” including communications module 230. But Figure 2 does not identify which components, if any, perform the “establishing communication” function, much less how they do so. Similarly, Figures 3, 7A (shown below), 8A, 9A, and 11 (also shown below), which WSOU also identifies, show certain generic components as a “black box,” including memory 330 and processor 300, but do not identify which components, if any, perform the “establishing communication” function or how.

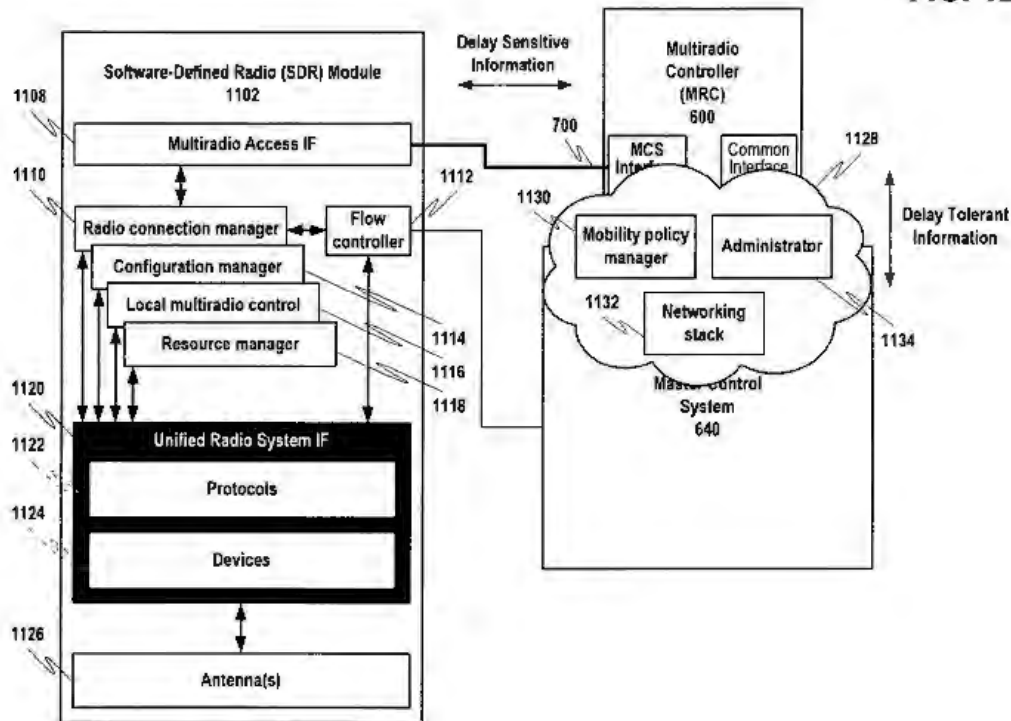
**FIG. 7A**



**FIG. 11**

Further, Figure 12 and its disclosure of SDR 1102, reproduced below, similarly do not disclose that SDR 1102 performs this “establishing communication” function, or any hardware, software, algorithms, steps, computer program code, instructions, or other structure for doing so.



**FIG. 12**

As shown above, the example of Software-Defined Radio Module 1102 in Figure 12 has a Multiradio Access IF 1108, certain “manager” modules 1110, 1114, 1116 and 1118, a “flow controller” 1112, a “Unified Radio System IF” 1120 having Protocols 1122 and Devices 1124, and one or more Antennas 1126. None of these sub-components is disclosed or linked by the specification to “establishing communication between the apparatus and the at least one other apparatus in accordance with the configuration.” See ’213 patent at 18:9–60 (describing these components). A POSITA would not understand from the specification that SDR 1102 of Figure 12 performs this “establishing communication” function, or that the SDR has sufficient structure to do so for the different examples and embodiments disclosed.

97. The lack of any corresponding structure for the function of “establishing communication between the apparatus and at least one other apparatus in accordance with the configuration” is particularly problematic due to the large number of communications protocols

that are identified by the specification of the '213 patent. As I have already discussed, the specification refers to at least five different “long-range” communications technologies, protocols, and standards including GSM, WCDMA, GPRS, PCS and WiMAX. '213 patent at, e.g., Fig. 3 and 7:22–35. The specification also refers to at least three different “broadcast communications” technologies, protocols, and standards including analog radio, DVB, and DAB. '213 patent at, e.g., Fig. 3. '213 patent at, e.g., Fig. 3 and 7:36–47. The specification refers to another seven different “short-range communications” technologies that include Bluetooth, WLAN, UWB, BT-ULP, Wireless USB, Zigbee, and UHF RFID. '213 patent at, e.g., Fig. 3 and 7:48–59. The specification even refers to additional “close-proximity communications” technologies, protocols, and standards such as RFID, IR communication, QR bar code readers, optical detectors, magnetic detectors, and CCD. '213 patent at 7:60–8:11. A POSITA would understand that “establishing communication” in each one of these communications and networking technologies, protocols, and standards would be complex and can depend upon a large number of different factors. Doing so also requires a large amount of information and settings in order for the two apparatuses to “establish” reliable communications between the devices. Once again, this is particularly so given the various different types of “remote characteristic information” and “local characteristic information” that the '213 patent’s specification and claim 22 identifies as possibly being used to formulate a configuration, which is then implemented by each apparatus in order to “establish” communications according to this function. '213 patent at 20:8–29 and 25:60–26:5. “Establishing communication” in accordance with the configuration can also be done in many different ways, using different hardware, software, computer program code, algorithms, instructions, or other structure. However, when attempting to identify any specific corresponding structure for this function, the specification does not give any examples at all or disclose any corresponding

structure for establishing communications using any of these communications and networking technologies, protocols, and standards, much less all of them. Without any guidance at all from the '213 patent specification, a POSITA has no guidance and simply cannot ascertain what structure performs the function of “establishing communication between the apparatus and at least one other apparatus in accordance with the configuration,” particularly for these and any other communications and networking technologies, protocols, and standards. As a result, and as I already discussed, a POSITA would conclude that the claim term “means for establishing communication between the apparatus and at least one other apparatus in accordance with the configuration” lacks any sufficient, clearly-linked corresponding structure, and is therefore indefinite.

98. I also understand that NEC asserts the similar claim term reciting “computer program code configured to establish communication between the apparatus and at least one other apparatus in accordance with the configuration” does not identify specific structure for performing the recited function of “establish communication between the apparatus and at least one other apparatus in accordance with the configuration.” Here, while the words “means for” are not used, the term “computer program code configured to” would be recognized by a POSITA as a nonstructural nonce word. And, because the claim limitation is set forth in functional language without the identification of sufficient structure to perform the claimed function, I understand that the term is to be construed subject to 35 U.S.C. § 112, ¶ 6. I understand that NEC’s position is that this term is subject to 35 U.S.C. § 112, ¶ 6, but is indefinite because there is no specification structure that is clearly linked, sufficient to perform, or corresponds to this function. I agree with NEC that a POSITA would not find the claim language reciting “computer program code being configured to ...” to be specific structure, material, or acts for performing the claimed function.

The claim merely suggests that computer code might be used to achieve the claimed function, but it does not identify any such computer code, or even the algorithm(s) that might be implemented using computer code. The claim's general recitation of "computer program code" does not identify any specific algorithm, steps, instructions, method, or computer program code for performing the recited function. A POSITA would find this claim language to be a generic recitation of a function to be performed by some unspecified computer program code. As a result, a POSITA would recognize that this "computer program code configured to ..." is to be construed under 35 U.S.C. § 112, ¶ 6. In other words, to understand this claim term, a POSITA would look to the specification for any corresponding, clearly-linked sufficient structure to achieve the claimed function. As discussed above, there is none and a POSITA would find that this term is indefinite. Specifically, the specification does not disclose any specific computer program code, algorithms, steps, or instructions for performing this function. As I have explained above for the similar "means for ..." term, the specification does not disclose any corresponding, clearly-linked, or sufficient computer program code (including any specific instructions, algorithms, or steps) that acts as "computer program code configured to establish communication between the apparatus and at least one other apparatus in accordance with the configuration." Also, WSOU's proposed construction does not identify any specific computer program code (e.g., specific algorithms, methods, or instructions) for performing the claimed function. As a result, in light of the specification, a POSITA would find the claim term reciting "computer program code configured to establish communication between the apparatus and at least one other apparatus in accordance with the configuration" does not reasonably inform a POSITA of what specific computer program code performs the recited, specific function. In my opinion, this claim term is therefore indefinite.

## 2. Discussion of Patent Claims 24, 25, and 26

99. Patent claims 24, 25, and 26 each have two claim terms written in substantially identical functional language. As such, I have grouped these substantially identical claim terms into two triplets of claim terms. With respect to claim 26, each associated term within the two triplets recites “means for” performing the specified function. With respect to claim 24, each associated term within the two triplets recites “computer program code configured to” perform the specified function. For claim 25, each associated term within the two triplets recites “the processor being configured to” perform the specified function. Because of this overlap, I discuss these three claims and their two triplets of claim terms below.

- (a) “means for implementing the configuration in the apparatus”; “computer program code configured to implement the configuration in the apparatus”; and “the processor being configured to implement the configuration in the apparatus”

<p>“Means for implementing the configuration in the apparatus” – ’213 Patent Claim 26</p> <p>“Computer program code configured to implement the configuration in the apparatus” – ’213 Patent Claim 24</p> <p>“The processor being configured to implement the configuration in the apparatus” – ’213 Patent Claim 25</p>	
NEC’s Construction	WSOU’s Construction
<p><i>Indefinite.</i></p> <p>“Means for ...,” and “computer program code configured to ...,” and “the processor being configured to ...” terms all governed by 35 U.S.C. § 112, ¶ 6.</p> <p><u>Function</u>: [implementing / to implement] the configuration in the apparatus.</p> <p><u>Structure/material/acts</u>: <i>No sufficient structure disclosed or clearly-linked; no specific hardware, software, program, algorithm, or steps.</i></p>	<p><b><u>“Means for implementing ... apparatus”</u></b>: Governed by 35 U.S.C. § 112, ¶ 6. This term is not indefinite.</p> <p><u>Function</u>: implementing the configuration in the apparatus.</p> <p><u>Structure/material/acts</u>: For example, apparatus B (1302) and process 7 of Fig. 13, <u>communications module 230 of Fig. 2, memory 330 and processor 300 of Figs. 3, 7A, 8A, 9A, or 11, software-defined radio module 1102 and</u></p>

	<p><u>software modules 1110-1118 of Fig. 12, and step 1468 of Fig. 14B, and the corresponding portions of the specification at 6:17-30, 6:50-7:22, 8:60-9:5, 17:8-52, 18:4-6, 18:45-60, 20:49-53, 22:11-15, and 22:56-65, and equivalents thereof.</u></p> <p><b><u>“Computer program code configured to implement ... apparatus”</u></b>: Not governed by 35 U.S.C. § 112, ¶ 6. This term is not indefinite. No construction necessary – plain and ordinary meaning.</p> <p><u>To the extent, however, that the Court treats the term as means-plus-function, the function and structure identified above (except that “processor 300” and “software-defined radio module 1102” were not identified for this term).</u></p> <p><b><u>“The processor being configured to implement ... apparatus”</u></b>: Not governed by 35 U.S.C. § 112, ¶ 6. This term is not indefinite. No construction necessary – plain and ordinary meaning.</p> <p><u>To the extent, however, that the Court treats the term as means-plus-function, the function and structure identified above.</u></p>
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100. The first two limitations discussed here that recite “means for implementing the configuration in the apparatus” (claim 26) and “computer program code configured to implement the configuration in the apparatus” (claim 24) are the same as these two limitations as they appear in claims 22 and 23, respectively. I already discussed those terms in Section VII.D.1(b), so I incorporate and refer here to my earlier analysis. As explained in that section, each of these claim terms is indefinite, as they also are here for the same reasons for claims 26 and 24.

101. The third related limitation here recites “the processor being configured to implement the configuration in the apparatus.” My understanding is that NEC asserts that this term is also subject to 35 U.S.C. § 112, ¶ 6 because NEC asserts that the claim does not disclose

sufficient, specific structure for performing the recited function of being “configured to implement the configuration in the apparatus.” My further understanding is that NEC asserts this term is indefinite because there is no specification structure that is clearly linked, sufficient to perform, or corresponds to this function. I agree with NEC that a POSITA would not find the claim language reciting “the processor being configured to ...” perform this function to be a specific structure, material, or act. A “processor” as recited in this claim term is nothing more than a general-purpose processor. The claims do not recite a specific processor having been configured to perform the recited function of having been configured “to implement the configuration in the apparatus.” Further, in order to “configure” the processor to perform the function, a POSITA would understand that the processor must be programmed with specific instructions and algorithms that perform the claimed function. Here, the claim language of claim 25 where this term appears does not identify any specific algorithm, steps, instructions, or method for performing this specific, recited function. Instead, it only recites:

[25.2.e] [the processor being configured to] implement the configuration in the apparatus; and

For these reasons, a POSITA would find that the “the processor being configured to” recites nothing more than a general purpose processor, and not specific structure necessary to perform the recited function. As a result, a POSITA would find that the claim term “the processor being configured to implement the configuration in the apparatus” is subject to 35 U.S.C. § 112, ¶ 6. A POSITA also would find that this term is indefinite because the specification does not disclose any corresponding, clearly-linked sufficient structure for performing this function. As I have explained in Section VII.D.1(b) for the similar “means for ...” and “computer program code configured to ...” terms, the specification does not disclose any corresponding, clearly-linked, or sufficient computer program code (including any specific instructions, algorithms, or steps) for performing

the claimed function. *See* Section VII.D.1(b). As a result, the specification does not disclose any “processor being configured to” perform the specified function, to the extent the configuration is done through computer program code and software. Also, WSOU’s proposed construction does not identify any special-purpose processor, computer program code, or other structure (e.g., specific algorithms, methods, or instructions) for performing the claimed function and configuring the processor as recited by the claim. As a result, in light of the specification, a POSITA would find the claim term reciting “the processor being configured to implement the configuration in the apparatus” does not reasonably inform a POSITA of what specific structure, materials, or acts, performs the recited, specific function or otherwise configures the computer. This claim term is therefore indefinite.

- (b) “means for establishing communication in accordance with the configuration”; “computer program code configured to establish communication in accordance with the configuration”; and “the processor being configured to establish communication in accordance with the configuration”

<p><b>“Means for establishing communication in accordance with the configuration” – ’213 Patent Claim 26</b></p> <p><b>“Computer program code configured to establish communication in accordance with the configuration” – ’213 Patent Claim 24</b></p> <p><b>“The processor being configured to establish communication in accordance with the configuration” – ’213 Patent Claim 25</b></p>	
<b>NEC’s Construction</b>	<b>WSOU’s Construction</b>
<p><i>Indefinite.</i></p> <p>“Means for ...,” and “computer program code configured to ...,” and “the processor being configured to ...” terms all governed by 35 U.S.C. § 112, ¶ 6.</p> <p><u>Function:</u> [establishing / to establish] communication in accordance with the configuration.</p>	<p><b><u>“Means for establishing ... configuration”:</u></b> Governed by 35 U.S.C. § 112, ¶ 6. This term is not indefinite.</p> <p><u>Function:</u> establishing communication in accordance with the configuration.</p>



<p><u>Structure/material/acts</u>: <i>No sufficient structure disclosed or clearly-linked; no specific hardware, software, program, algorithm, or steps.</i></p>	<p><u>Structure/material/acts</u>: For example, apparatus B (1302) and process 8 of Fig. 13, <u>communications module 230 of Fig. 2, memory 330 and processor 300 of Figs. 3, 7A, 8A, 9A, or 11, software-defined radio module 1102 and software modules 1110-1118 of Fig. 12, and step 1456 of Fig. 14B</u>, and the corresponding portions of the specification at <u>6:17-30, 6:50-7:22, 8:60-9:5, 17:8-52, 18:4-6, 18:45-60, 20:53-56, 22:11-15, and 22:65-67</u>, and equivalents thereof.</p> <p><b><u>“Computer program code configured to establish ... configuration”</u></b>: Not governed by 35 U.S.C. § 112, ¶ 6. This term is not indefinite. No construction necessary – plain and ordinary meaning.</p> <p><u>To the extent, however, that the Court treats the term as means-plus-function, the function and structure identified above (except that “processor 300” and “software-defined radio module 1102” were not identified for this term).</u></p> <p><b><u>“The processor being configured to establish ... configuration”</u></b>: Not governed by 35 U.S.C. § 112, ¶ 6. This term is not indefinite. No construction necessary – plain and ordinary meaning.</p> <p><u>To the extent, however, that the Court treats the term as means-plus-function, the function and structure identified above.</u></p>
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102. The first two limitations discussed here that recite “means for establishing communication in accordance with the configuration” (claim 26) and “computer program code configured to establish communication in accordance with the configuration” (claim 24) are the same as these two limitations as they appear in claims 22 and 23, respectively. I already discussed those terms in Section VII.D.1(c), so I incorporate and refer here to my earlier analysis. As

explained in that section, each of these claim terms is indefinite, as they also are here for the same reasons for claims 26 and 24.

103. The third related limitation here recites “the processor being configured to establish communication in accordance with the configuration.” My understanding is that NEC asserts that this term is also subject to 35 U.S.C. § 112, ¶ 6 because NEC asserts that the claim does not disclose sufficient, specific structure for performing the recited function of being “configured to establish communication in accordance with the configuration.” My further understanding is that NEC asserts this term is indefinite because there is no specification structure that is clearly linked, sufficient to perform, or corresponds to this function. I agree with NEC that a POSITA would not find the claim language reciting “the processor being configured to ...” perform this function to be a specific structure, material, or act. A “processor” as recited in this claim term is nothing more than a general-purpose processor. The claims do not recite a specific processor having been configured to perform the recited function of having been configured “to establish communication in accordance with the configuration.” Further, in order to “configure” the processor to perform the function, a POSITA would understand that the processor must be programmed with specific instructions and algorithms that perform the claimed function. Here, the claim language of claim 25 where this term appears does not identify any specific algorithm, steps, instructions, or method for performing this specific, recited function. Instead, it only recites:

[25.2.f] [the processor being configured to] establish communication in accordance with the configuration.

For these reasons, a POSITA would find that the “the processor being configured to” recites nothing more than a general purpose processor, and not specific structure necessary to perform the recited function. As a result, a POSITA would find that the claim term “the processor being configured to establish communication in accordance with the configuration” is subject to 35

U.S.C. § 112, ¶ 6. A POSITA also would find that this term is indefinite because the specification does not disclose any corresponding, clearly-linked sufficient structure for performing this function. As I have explained in Section VII.D.1(c) for the similar “means for ...” and “computer program code configured to ...” terms, the specification does not disclose any corresponding, clearly-linked, or sufficient computer program code (including any specific instructions, algorithms, or steps) for performing the claimed function. *See* Section VII.D.1(c). As a result, the specification does not disclose any “processor being configured to” perform the specified function, to the extent the configuration is done through computer program code and software. Also, WSOU’s proposed construction does not identify any special-purpose processor, computer program code, or other structure (e.g., specific algorithms, methods, or instructions) for performing the claimed function and configuring the processor as recited by the claim. As a result, in light of the specification, a POSITA would find the claim term reciting “the processor being configured to establish communication in accordance with the configuration” does not reasonably inform a POSITA of what specific structure, materials, or acts, performs the recited, specific function or otherwise configures the computer. This claim term is therefore indefinite.

#### **E. Construction of the Remaining Disputed Claim Terms**

104. Following is my analysis of the remaining disputed claim terms for the ’213 patent for which I have been asked to present an opinion on their scope and meaning to a POSITA.

##### **1. “communication load information for the [at least one other] apparatus”**

<b>“Communication load information for the [at least one other] apparatus” – ’213 Patent Claims 1, 8, 22, 23, 24, 25, and 26</b>	
<b>NEC’s Construction</b>	<b>WSOU’s Construction</b>
“communication load of an internal controller in the [at least one other] apparatus”	No construction necessary – plain and ordinary meaning, which is “information regarding communication load for the [at least one other] apparatus”

105. The claim term “communication load information for the [at least one other] apparatus” appears in each asserted claim of the ’213 patent. Claim element [1.b] is representative, and recites:

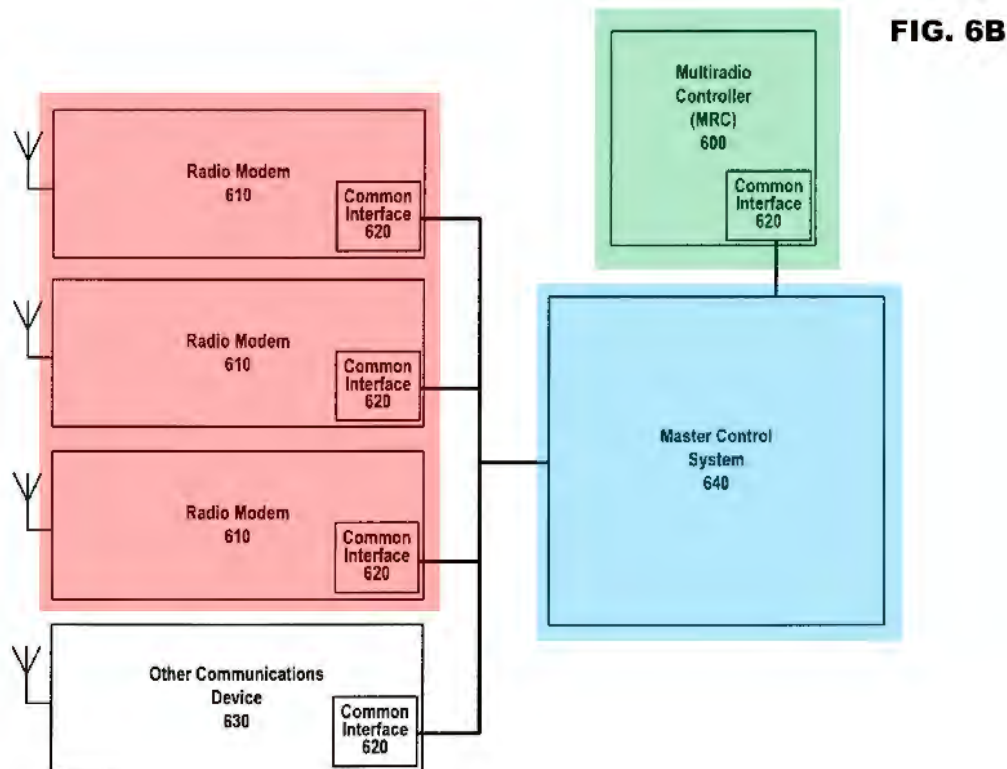
[1.b] receiving remote characteristic information into the apparatus, the remote characteristic information comprising at least one of supported communication transport configuration information for the at least one other apparatus, power status information for the at least one other apparatus, processing load information for the at least one other apparatus, *communication load information for the at least one other apparatus*, proximate interference information for the at least one other apparatus and user preferences configured in the at least one other apparatus;

NEC and WSOU dispute the plain and ordinary meaning of this term. WSOU asserts the term does not require construction, and proposes a plain and ordinary meaning that is largely duplicative of the claim language. But “communication load” is not a term of art in the fields of networking, communications or computers that would have a readily recognizable meaning to a POSITA. And WSOU’s proposal does not explain or otherwise specifically identify what is meant by “communication load” for the apparatus. NEC’s proposal, on the other hand, draws from the patentee’s identification of communication load as the load of an internal controller. A POSITA attempting to determine the meaning of this non-standard phrase, when viewing the claim language and specification, would understand the term consistently with the construction proposed by NEC.

106. “Communication load” itself has no plain and ordinary meaning in the context of the ’213 patent claims, beyond a vague and generic sense that it refers to sending and receiving something by way of communication. The claim language does not explain whether the “communication load” being measured is internal or external to the apparatus, which particular communication links are being measured, or what communication links are at issue. So too there is no plain and ordinary meaning of “information” other than in a very generic and vague sense,

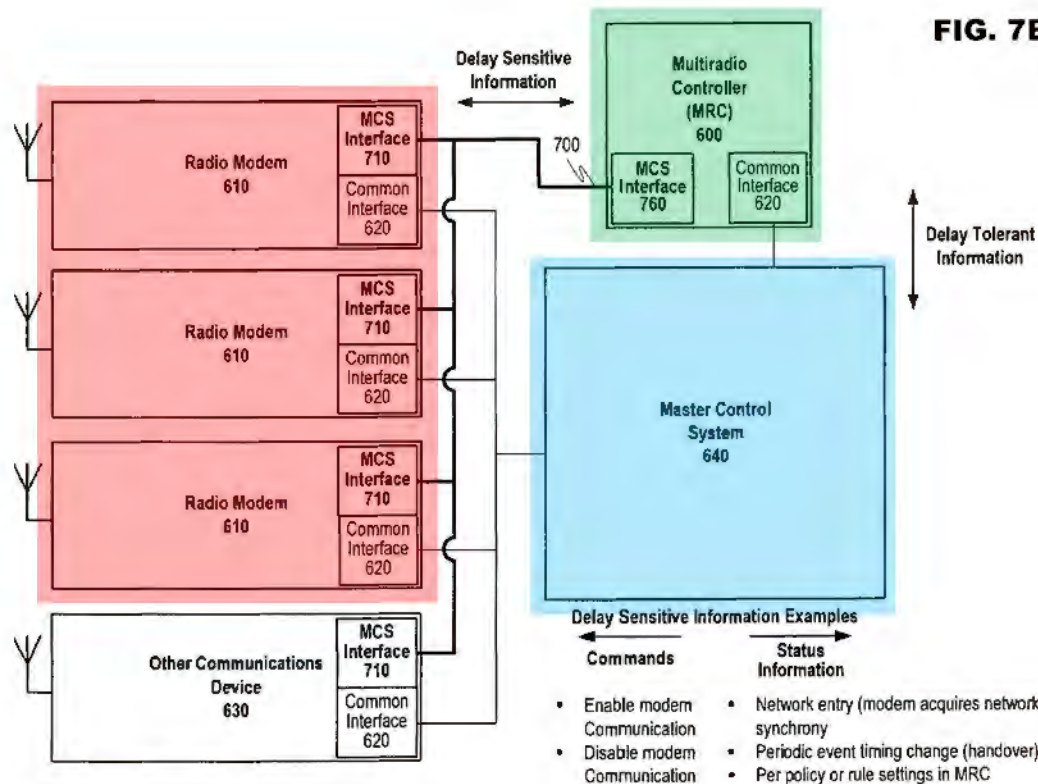
and no apparent meaning to a POSITA of what is meant by “communication load information.” As a result, it would be necessary for a POSITA to look beyond just the claims in order to understand what is meant by “communication load information for the [at least one other] apparatus”. Certainly, “communication load” in a generic sense is typically understood by a POSITA to refer to some amount of communications, and perhaps an attendant burden or loading on the communications channel or a related component, such as the amount of data sent and received, whether in an absolute sense (*e.g.*, amount of bytes per second), relative sense (*e.g.*, percentage of total load that the communications channel or component can handle), and perhaps other information, measurement, or statistics (*e.g.*, capacity, minimum, maximum). But the claim language alone here does not provide reasonable notice to a POSITA about what is meant by “communication load information for the [at least one other] apparatus.

107. My understanding is a POSITA must always read the claim language in the context of the specification. Doing so here resolves the ambiguity I explain above about the meaning of “communication load information for the [at least one other] apparatus”. Specifically, the specification explains that the “communication load” is referring to the communication load of an internal controller in the apparatus. ’213 patent at 14:52. To explain, I start with Figures 6A, 6B, and 6C, which disclose an embodiment of the wireless communication device. Specifically, Figure 6B is “a more detailed structural representation” of the “wireless communication device” of Figure 6A “including a multiradio controller.” ’213 patent at 3:65–4:3. Figure 6B, reproduced below, discloses a “multiradio controller (MRC) 600” which I have annotated in green, ’213 patent at 10:17–19, a “master control system 640” which I have annotated in blue, ’213 patent at 10:27–29, and a plurality of “radio modems 610” which I have annotated in red, ’213 patent at 10:19–23.



The specification further explains that information is sent or received between the MRC 600 (green), the master control system 640 (blue), and the radio modems 610 (red), through the common interfaces 620. '213 patent at 10:24–44. Thus, Figure 6B (as well as 6A and 6C) disclose and explain certain components of the wireless communication device, including of these components and the communications that occur between them through their interfaces. However, this specification does not discuss “communication load” or what might be meant for “communication load information” of the apparatus for this first embodiment.

108. Turning next to Figure 7B, it discloses another, second embodiment of the wireless communication device building upon the embodiment I have just discussed. I reproduce Figure 7B below, with the same annotations for the same components as in Figure 6B.



Once again, this embodiment also has a plurality of radio modems 610 (red), a multiradio controller (MRC) 600 (green), and a master control system 640 (blue). In addition to the common interfaces 620 for communicating to and from the master control system 640, additional MCS interfaces 710 and 750 are shown for communications between the multiradio controller (MRC) 600 and each of the radio modems 610. The specification explains that in this embodiment:

MCS 700 may directly link communication resources in modules 310, 312, 320 and 340 to MRC 600. In this way, MCS 700 may be configured to provide a dedicated low-traffic communication structure for carrying delay sensitive information both to and from MRC 600.

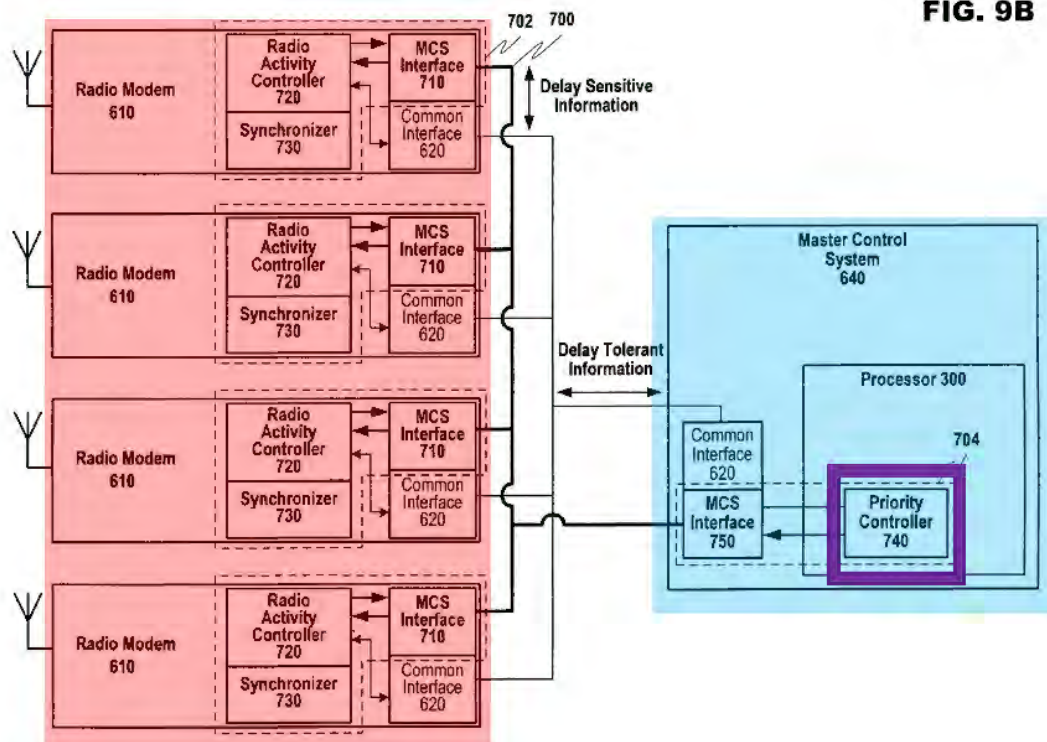
'213 patent at 11:5–9. However, once again, the specification does not discuss “communication load” or what might be meant for “communication load information” of the apparatus for this second embodiment.







110. It is the fourth embodiment of the '213 patent, described in Figures 9A, 9B, and 9C, that discusses and explains what is meant by “communication load” and what would be “communication load information. Figure 9B is similar to the earlier embodiment figures, and discloses “the inclusion of distributed control component 704 onto [Master Control System] MCS 700 is ... in more detail.” '213 patent at 14:33–35. Figure 9B is reproduced below, with similar annotations as the earlier embodiments discussed above.



In this figure, the Master Control System includes a “priority controller 740 coupled to the MCS interface 750”. '213 patent at 14:35–36. This master control system’s priority controller 740 is annotated with a purple box. When explaining what is meant by “communication load” and related communication load information, the specification discloses here that these terms are referring to the amount of data sent to and received by priority controller 740.

Referring now to FIG. 9B, the inclusion of distributed control component 704 onto MCS 700 is shown in more detail. Distributed control component 704 includes at least priority controller 740

coupled to MCS interface 750. MCS interface 750 may allow *priority controller 740 to send information to, and receive information from, radio activity controllers 720* via a low-traffic connection dedicated to the coordination of communication resources in WCD 100.

\* \* \* \* \*

Further, common interface system 620 of WCD 100 may be relieved of having *to accommodate communication traffic* from distributed control component 704, reducing the overall *communication load* in master control system 640

'213 patent at 14:33–40 and 49–58. This same portion of the specification explains the concern with distributing and reducing communication load to improve efficiency, stating:

Performance may improve because *quicker communication* between distributed control components 702 and 704 may result in faster relative priority resolution in radio activity controllers 720

'213 patent at 14:45–48. This portion of the specification (and others, for other embodiments) also express concern with managing the communication load between controllers, including between the radio activity controllers 720 of the radio modems 610, the priority controller 740 of the master control system 640, and the multiradio controller (MRC) 600, for efficiently sending and receiving information between these different controllers. See '213 patent at 14:54–59 . A POSITA, reading the entire specification including the portions discussed above, would conclude that the “communication load” being referred to in the asserted claims, refers to the communication load of an internal controller (such as the radio activity controllers 720, the priority controller 740, or the multiradio controller (MRC) 600). A POSITA would further understand that “communication load information” as claimed is information about these communication loads for information being sent to, or received by, one or more controllers. A POSITA would also understand from these disclosures that the “communication load” and “communication load information” being referred to is internal communications load across the different buses between these different

components, and not external communication loads related to wireless transmissions external to the apparatus between the radio modems and other devices through the antennas. The '213 patent specification never refers to any external communications between the apparatus and other devices as having a “communication load,” or determining “communication load information” related to external device communications.

111. WSOU’s proposed plain and ordinary meaning construction does not resolve this issue of whether “communication load information” is referring to communications internal or external to the apparatus. Nor does WSOU’s proposal address what components, if any, within the apparatus are sending and receiving information in order to determine what is “communication load information.” As explained above, the specification informs a POSITA that the meaning of “communication load information” here is “communication load of an internal controller in the [at least one other] apparatus.” Further, because there is no plain and ordinary meaning of “communication load information” to a POSITA, which standing alone is a generic and vague term, this is the correct construction, particularly in light of the specification.

## 2. “power status information”

“Power status information” – ’213 Patent Claims 1, 8, 22, 23, 24, 25, and 26	
NEC’s Construction	WSOU’s Construction
<i>Indefinite</i>	No construction necessary – plain and ordinary meaning

112. The claim term “power status information” appears in each asserted claim of the ’213 patent. Claim element [1.b] is representative, and recites:

[1.b] receiving remote characteristic information into the apparatus, the remote characteristic information comprising at least one of supported communication transport configuration information for the at least one other apparatus, **power status information** for the at least one other apparatus, processing load information for the at least one other apparatus, communication load information for the at least one other apparatus, proximate interference information for the at

least one other apparatus and user preferences configured in the at  
least one other apparatus;

NEC and WSOU dispute the plain and ordinary meaning of this term. WSOU asserts the term does not require construction, and does not propose any other meaning or explanation as far as what the plain and ordinary meaning of “power status information” might be. NEC’s proposal, on the other hand, is this term is indefinite because it fails to inform a POSITA with reasonable certainty what is meant by “power status information.” A POSITA attempting to determine the meaning of this phrase, when viewing the claim language and specification, would determine that NEC’s proposed construction is correct in that the term is indefinite.

113. “Power status” itself has no plain and ordinary meaning in the context of the ’213 patent claims, beyond a vague and generic sense that it refers to something about power and the apparatus. There are a wide variety of possible meanings and understandings of “power status,” which may or may not be applicable here. Examples here are:

- The types of power sources and supportable power sources of the device or its components (*e.g.*, battery and its type, wired or plugged in power source, etc., including for the radios, the controllers, the hardware, the software, etc.)
- The amount of power remaining for the device or its individual components (*e.g.*, battery power, current reading, absolute, relative, capacity, minimum, and/or maximum);
- The power operating limits of the device or its components (*e.g.*, maximum power, minimum power, average power, etc., possibly for the device, its radios, its controllers, its hardware, or its software);
- Transmission power of radio signals by the device and its radios (*e.g.*, absolute, relative, capacity, minimum, and/or maximum);

- Reception power of radio signals by the device and its radios (*e.g.*, absolute, relative, capacity, minimum, and/or maximum);
- Different available power modes of the device, its components, its hardware, its software, or its radios (*e.g.*, asleep, low-power, awake, high-power, or some other modes);
- The current amount of power being consumed (*e.g.* 1.5 watts);
- Whether or not there is a power failure;
- Whether a device is in a restricted mode such as Airplane mode that restricts the radiation of power.

So too there is no plain and ordinary meaning of “information” other than in a very generic and vague sense, and no apparent meaning to a POSITA of what is meant by “power status information.” Additionally, the claims including the term “power status information” indicate that the “power status information” is used to formulate a configuration that is then implemented to established communication between apparatuses, and a POSITA would expect only that certain information—not just any or all of what is listed above—would be needed or usable to formulate the configuration. As a result, it would be necessary for a POSITA to look beyond just the claims in order to understand what is meant by “power status information.” The claim language alone here does not provide reasonable notice to a POSITA about what is meant by “power status information” for the at least one other apparatus.

114. Again, my understanding is a POSITA must always read the claim language in the context of the specification of the '213 patent. However, doing so here does not resolve the vagueness and ambiguity I explain above about the meaning of “power status information.” Instead, the specification’s very brief use of the word “power” only further exacerbates that this

term is subject to different possible meanings but unclear to a POSITA. For example, in the specification's background section, the specification discusses Bluetooth as an example of a short-range wireless technology that supports "additional power boosting," but does not say this is what is meant by "power information" or discuss any information associated with "power boosting" for the alleged invention and patent claims. '213 patent at 1:47–50; see also id. at 5:46–49 (discussing increasing transmission range based upon "additional power boosting"); 7:53 (referring to "UWB Ultra-Low Power Bluetooth"). The background section also states that some prior art "apparatuses may continually switch between active communication and power savings modes" but, again, does not further indicate this is what is claimed or what the associated "power status information" would be. '213 patent at 1:60–62. The background further briefly mentions that software-based modules may be used to omit hardware components "while being more efficient in terms of power, space, etc.," but says nothing more. '213 patent at 2:25–29. None of these background discussions of power explain the meaning of "power status" or "power status information." Instead, they only reinforce that the term can have different meanings, such as referring to power boosting which appears to related to transmitting wirelessly at a higher transmit power level to different wireless communication technologies such as Bluetooth, and referring to possible power savings modes which has to do with internal power consumption of a device.

115. Turning to the specification's description of example embodiments, again the discussion and use of the word "power" is vague and ambiguous. For example, the specification mentions that for close-proximity communication by a scanning device, then the device may "require a power source." '213 patent at 5:12–15. The specification also states that "[t]he transmission range between two apparatuses may be extended if both device [sic: devices] can participate in powered communication using more robust wireless transports." '213 patent at

5:29–31. The specification also states that the apparatus may have many different “individual components [that] may be replaced by integrated circuits in the form of a programmable logic device, gate array, ASIC, multi-chip module, etc. ... [and] each of these components may be coupled to a power source, such as a removable and/or rechargeable battery (not shown).” ’213 patent at 8:53–59. This passage too does not explain what is “power status information” or what is meant by “power status,” including for these different possible components. The specification mentions that the “SLIMbus” standard offers the same or less power as the I2C and I2S interfaces. ’213 patent at 12:15–19.

116. The final references to power in the specification are related to a software defined radio (SDR) module and, very generically, the apparatus itself, stating:

- Characteristics like apparatus status (e.g., process load, pending messages, ***power condition***, etc.) and the environment proximate to an apparatus may be utilized to configure SDR module 1102. ’213 patent at 18:62–65.
- For instance, apparatus status information may include ... ***current apparatus power condition***.... ’213 patent at 20:13–18.
- Once Apparatus A 1300 has both the remote and local characteristic information, a configuration for SDR module 1102 may be formulated. The configuration may define ... operational schemes (***e.g., power saving***, high speed, etc.).... ’213 patent at 20:35–44
- It is important to note that, in various embodiments of the present invention, the communication may continue in accordance with the existing configuration until an event occurs that would necessitate a new configuration. Examples of events that may necessitate a new configuration may include ... a status change in either apparatus (***e.g., power depletion***), etc.

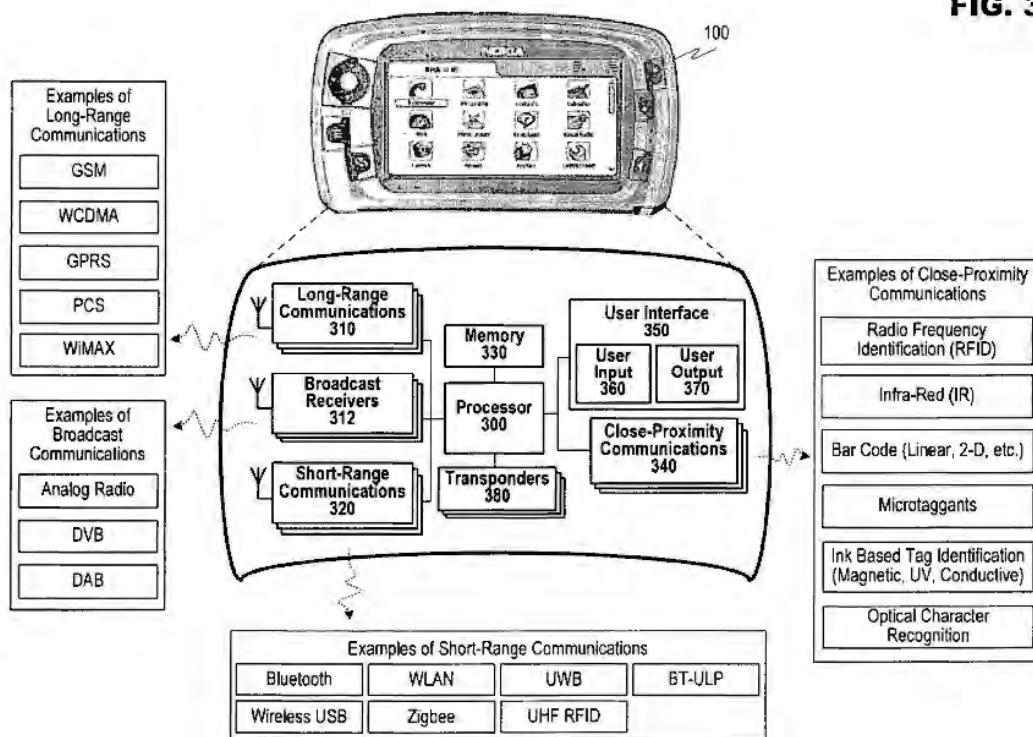
None of the above portions of the specification explain what is meant by “power status” of the apparatus or “power status information.” The reference to “current apparatus power condition”



above in the specification is just as vague as the claim's own language: "power status." The brief references to "power condition," "power saving," and "power depletion" are similarly vague. None of these brief portions explains what is meant by "power status" to a POSITA, or what qualifies as "power status information."

117. The vagueness of the meaning of "power status" and "power status information" is further exacerbated by the specification's overall description of potential apparatuses and supported communication protocols. For example, Figure 3, discloses an apparatus that supports a wide variety of "long range communications" (e.g., GSM, WCDMA, GPRS, PCS, and Wi-Max), '213 patent at 7:23–35, "broadcast communications" (e.g., analog radio, DVB, and DAB), '213 patent at 7:36–47, and short-range communications (e.g., Bluetooth, WLAN, UWB, BT-ULP, Wireless USB, Zigbee, and UHF RFID), '213 patent at 7:48–59.

**FIG. 3**





These different wireless communications protocols, as well as hardware and software that implement them in an apparatus, can implicate numerous different characteristics, settings, and other information that could or could not be characterized as power-related information, including information about status. Again, that can include information about types and supportable power sources; transmission power and methods; reception power and methods; device and component power; power states, conservation, savings modes and settings; wireless channel power and settings; and many, many other power-related issues. In fact, these devices are based on the use of electricity. When electrons flow from one location to another, this is known as electrical current. When there is some resistance, which there always is, power is consumed. So, the concept of current and power are fundamentally linked and are pervasive through an electronic device, thus making the concept of “power status” or “power information” not reasonably understood without guidance from the inventor. Based on my review of the specification, no such guidance is provided. The ’213 patent’s specification is at an extremely high level, is largely black box, is very vague and ambiguous, and does not provide any reasonable guidance to a POSITA about what the claims mean by “power status” or “power status information” for an apparatus.

118. For all of these reasons, the claims of the ’213 patent, when read in light of the specification, fail to inform a POSITA with reasonable certainty what is the meaning and scope of “power status information.” This claim term and the claims it is found within are therefore indefinite.

**3. “proximate interference information for the [at least one other] apparatus”**

<b>“Proximate interference information for the [at least one other] apparatus” – ’213 Patent Claims 1, 8, 22, 23, 24, 25, and 26</b>	
<b>NEC’s Construction</b>	<b>WSOU’s Construction</b>
<i>Indefinite</i>	No construction necessary – plain and ordinary meaning

119. The claim term “proximate interference information for the [at least one other] apparatus” appears in each asserted claim of the ’213 patent. Claim element [1.b] is representative, and recites:

[1.b] receiving remote characteristic information into the apparatus, the remote characteristic information comprising at least one of supported communication transport configuration information for the at least one other apparatus, power status information for the at least one other apparatus, processing load information for the at least one other apparatus, communication load information for the at least one other apparatus, *proximate interference information for the at least one other apparatus* and user preferences configured in the at least one other apparatus;

NEC and WSOU dispute the meaning of this term. WSOU asserts the term has a plain and ordinary meaning and it does not require construction and does not propose any other meaning or explanation as far as what the plain and ordinary meaning of “proximate interference information for the [at least one other] apparatus” might be. NEC’s proposal, on the other hand, is this term is indefinite because it is a term of degree having no plain and ordinary meaning to a POSITA, and the ’213 patent specification fails to inform a POSITA with reasonable certainty what is meant by “proximate interference information for the [at least one other] apparatus.” A POSITA attempting to determine the meaning of this phrase, when viewing the claim language and specification, would determine that NEC’s proposed construction is correct in that the term is indefinite.

120. A POSITA would understand that “proximate interference information for the [at least one other] apparatus” generally refers to some sort of information regarding “interference” experienced by the other apparatus that is “proximate” to that apparatus. A POSITA also would understand that “interference” could come in different forms. For example, “interference” could refer to interference with a wireless transmission that is sent or received, which causes transmission errors. “Interference” could also refer to other conditions or issues that interfere with or prevent

wireless communications between the apparatus and another apparatus using one of the long-range, broadcast, or short-range communications protocols.

121. The reason this term is indefinite is due to the adjective “proximate” that describes the type of interference information. A POSITA would understand that “proximate” requires the interference to be a particular distance or range that is sufficiently close to the apparatus, such that the interference is then “proximate” to the apparatus. A POSITA therefore would understand “proximate” in this context is a term of degree. However, the claim language itself does not explain or define what is meant by “proximate,” including how close to the apparatus the interference has to be in order to be considered “proximate” interference. Further, there is no generally-accepted, plain and ordinary meaning of “proximate” to a POSITA, or any understood distance or range that is understood to be “proximate” (versus not proximate) to an apparatus. This is particularly true for the ’213 patent claims, which describe the apparatuses at a very high, generic level and without regard to any particular radio communication protocol, and presumably covering a wide variety of apparatuses and protocols. The claim language itself simply says that the interference is “proximate” without defining what the scope and limits of “proximate interference” are including, in particular, how close or far away the interference (and, possibly, interfering device) must be to be considered “proximate”. As a result, I have turned to the specification to see if it reasonably informs a POSITA about the meaning of “proximate,” specifically, at what distance and range that interference would (and would not) be considered “proximate.”

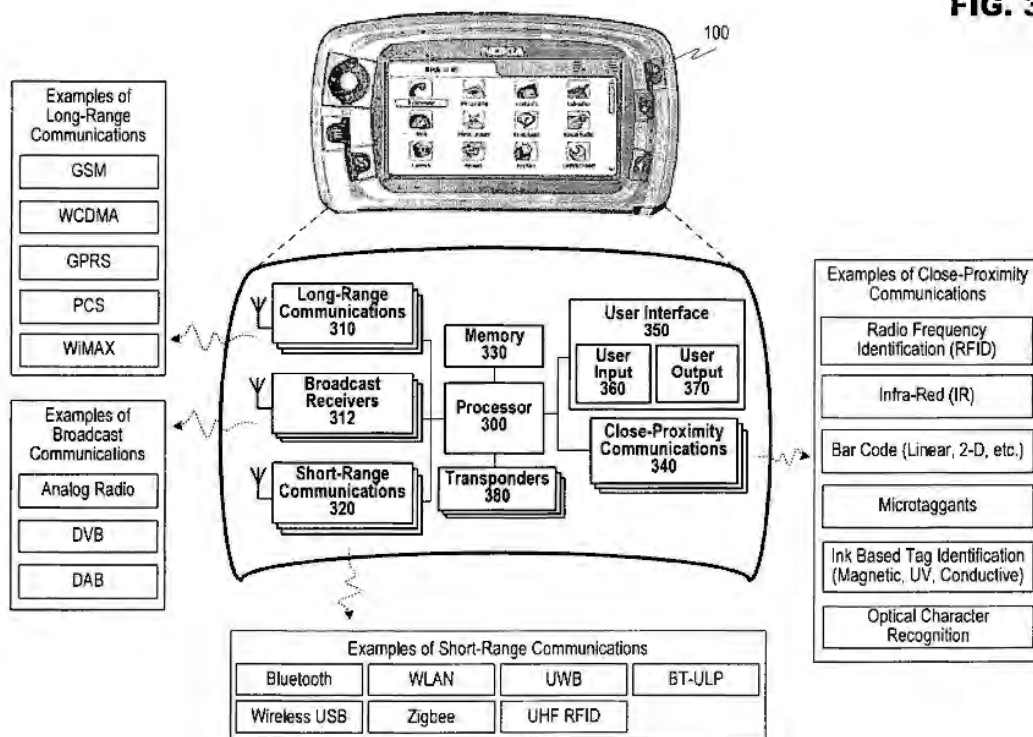
122. The specification does not reasonably inform a POSITA what is meant by “proximate” or provide any objective boundaries about what distance and range from the apparatus that interference would be considered “proximate interference.” As a result, the specification fails to reasonably inform a POSITA what is meant by “proximate interference information for the [at

least one other] apparatus.” In fact, the specification only exacerbates the vagueness and lack of objective boundaries about what the claims mean by “proximate interference” and related information about the other apparatus. The specification uses the word “proximate” only three places. First, the specification very briefly refers to “a large number of devices [that] are queued for service in the area *proximate* to the access point.” ’213 patent at 5:44–46. This brief statement does not explain what ranges or distance is considered “proximate,” nor does it refer at all to the concept of interference or “proximate interference,” which may differ from a device simply being in an area proximate to an access point. As a result, this portion does not provide any guidance or objective boundaries on “proximate interference” or “proximate interference information for the [at least one other] apparatus.” Second, the specification very briefly states that “[c]haracteristics like ... the environment *proximate* to an apparatus may be utilized to configure [software defined radio] SDR module 1102.” ’213 patent at 18:62–65. This statement also fails to explain the range or amount of distance from the apparatus that is considered to be “proximate.” Further, this very brief statement does not refer to proximate interference, which could be different than simply the “environment” considered to be proximate to the apparatus. This does not provide any objective boundaries about what is “proximate” for purposes of interference experienced by the apparatus and how far or close is “proximate.” The third specification recitation is similar to the second just discussed, stating that “[r]emote characteristics comprise information related to the apparatus with which communication is desired (e.g., apparatus B 1302), and may include information regarding apparatus status and/or environmental conditions *proximate* to the apparatus.” ’213 patent at 20:8–12. Once again, this portion of the specification fails to explain or define objective boundaries for how close to the device is considered “proximate,” while failing to refer to interference specifically. No other passages of the specification refer to being “proximate” to an apparatus,

much less proximate interference. The specification fails to inform a POSITA what distance, range, or other objective boundary exists for interference to be considered to be “proximate” to the apparatus and for interference information to be “proximate interference information for the [at least one other] apparatus as claimed.

123. Once again, the vagueness of the meaning of “proximate interference information” is further exacerbated by the specification’s overall description of potential apparatuses and supported communication protocols. As already discussed, Figure 3, discloses an apparatus that supports a wide variety of “long range communications” (e.g., GSM, WCDMA, GPRS, PCS, and Wi-Max), ’213 patent at 7:23–35, “broadcast communications” (e.g., analog radio, DVB, and DAB), ’213 patent at 7:36–47, and short-range communications (e.g., Bluetooth, WLAN, UWB, BT-ULP, Wireless USB, Zigbee, and UHF RFID), ’213 patent at 7:48–59.

**FIG. 3**



These different wireless communications protocols send and receive information over a wide variety of distances, using various different types of channels (e.g., control/signaling, transmit, and receive) and using a wide variety of transport mechanisms, protocols, encoding mechanisms, error correction protocols, and so forth (e.g., time division multiple access (TDMA), code division multiple access (CDMA), frequency division multiple access (FDMA)), as well as hybrids and combinations of these different protocols. There is no accepted, general definition or understanding among POSITAs about what qualifies as “proximate” or “proximate interference” for any of these long-range, short-range, and broadcast communications protocols. Indeed, POSITAs could reasonably disagree what interference is close to or far away from these devices depending on the particular communication protocol, device settings, environmental conditions, and countless other factors. Further, there are similarly countless different types of “interference” that might be associated with these different protocols, where there is no way to know if a POSITA would consider that interference to be “proximate” to the apparatus or not. Due to its high-level, generic description of black-box structure attempting to cover a wide range of communications protocols and types of interference, there is simply no objective way to assess and for a POSITA to understand or determine whether interference is “proximate interference,” or to therefore understand what is meant by “proximate interference information for the [at least one other] apparatus.”

124. In addition to the reasons I have already explained above, a further reason that “proximate interference” and “proximate interference information for the [at least one other] apparatus” are indefinite is specifically the role that the power of a wireless signal plays in the distance that wireless signals are transmitted and potential interference with an apparatus. As a hypothetical but real example, assume two devices, which we will label “device FAR” and “device

NEAR,” each of which is transmitting a wireless signal that is causing interference with an apparatus. The first device, device FAR, may be a long distance away from the apparatus and not “proximate,” and yet it may be transmitting at a higher power—causing its signal to travel farther when interfering with the apparatus. Conversely, the second device, device NEAR, may be much closer to the apparatus, and yet transmitting at a lower power—causing its signal to travel shorter when it interferes with the apparatus. From the apparatus’s point of view, the interference it experiences from device FAR and device NEAR could be identical, despite the fact that device NEAR is much closer than device FAR. In fact, if the transmission power of device FAR is high enough as compared to device NEAR, the interference from device FAR experienced by the apparatus could even be *greater* than that from device NEAR, despite the fact that device FAR is *farther away* from the apparatus than device NEAR. The point of this example is to illustrate that for the apparatus that is being interfered with, it has no way to know or assess whether device FAR or device NEAR is “proximate” to it, or whether the interference being experienced is “proximate interference.” Instead, because of possible power differences between device FAR and device NEAR, it may be that device FAR that is farther away (not “proximate” to the apparatus) is causing more interference than device NEAR that is closer but transmitting at a much lower power. To be clear, this is a real-world situation that frequently occurs, where a device that is farther away may nonetheless cause more interference than a device that is much closer, due to the different in transmission power. Thus, the apparatus being interfered with has no way of knowing or detecting from the nature of the interference alone whether the interfering device and its interference are “proximate” or not to the apparatus.

125. For all of these reasons, the claims of the ’213 patent, when read in light of the specification, fail to inform a POSITA with reasonable certainty what is the meaning and scope of

“proximate interference information for the [at least one other] apparatus.” This is a term of degree and there is no plain and ordinary meaning to a POSITA about what distance or range from a device qualifies as being “proximate,” particularly for purposes of what is “proximate interference” and related information. The specification of the ’213 patent does not provide any objective boundaries or other way for a POSITA to assess whether interference is “proximate” or to identify what is meant by “proximate interference information for the [at least one other] apparatus.” As a result, this claim term and the claims it is found within are therefore indefinite.



**List of Exhibits**

<b>Exhibit</b>	<b>Description</b>
Exhibit A	Dr. Shoemake's <i>curriculum vitae</i>
Exhibit B	List of materials considered
Exhibit C	U.S. Patent No. 7,885,398 ("the '398 patent")
Exhibit D	Prosecution history of the '398 patent
Exhibit E	U.S. Patent No. 8,103,213 ("the '213 patent")
Exhibit F	Prosecution history of the '213 patent

# **EXHIBIT A**

## **Dr. Shoemake's CV**



# Matthew B. Shoemake

## *Curriculum Vitae*

*Last updated September 8, 2021*

### Personal Information

Born **February 1971 in Pauls Valley, Oklahoma, USA**  
Citizenship **United States of America**  
Marital Status **Married to Bobbie Jo DeKay Shoemake since August 1998**  
Children **One daughter, age 19, and one son, age 15**

### Education

1999 **Ph.D. in Electrical Engineering**, *Cornell University*, Ithaca, New York.  
1997 **M.S. in Electrical Engineering**, *Cornell University*, Ithaca, New York.  
1994 **B.S. in Computer Science**, *Texas A&M University*, College Station, Texas,  
*with honors*.  
1994 **B.S. in Electrical Engineering**, *Texas A&M University*, College Station,  
Texas, *with honors*.  
1989 **Valedictorian**, *Mexia High School*, Mexia, Texas.

### Work Experience

2016–Present **Owner & President**, PERITUM LLC, Fairview, Texas.  
    ○ Peritum provides expert consulting services.  
    ○ Providing services since 2008. Incorporated in 2016.  
2008–2018 **President & CEO**, BISCOTTI INC., Allen, Texas.  
    ○ Biscotti develops high-definition, video calling systems for the home and office.

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- 2003–2008 **President & CEO**, WiQUEST COMMUNICATIONS, INC., Allen, Texas.
- Developed world's first 1 Gbps ultrawideband chipset
  - Developed world's first wireless VGA/DVI system for notebook computers
  - Customers put into product: Dell, Toshiba, Lenovo, Belkin, D-Link and Kensington
  - Built company from inception to 120 employees with offices and personnel in Texas, India, California, Taiwan and Japan.
- 2000–2003 **Director Advanced Technology, Wireless Networking Business Unit**, TEXAS INSTRUMENTS, INC., Dallas, Texas.
- Lead development of Bluetooth and Wi-Fi coexistence technology
  - Lead TI efforts to enhance the IEEE 802.11 standards with quality of service extensions
  - Lead development of very low power Wi-Fi technology for mobile phones
  - Designed Wi-Fi into Nokia Communicator
- 1998–2000 **Manager, Baseband Systems Team**, ALANTRO COMMUNICATIONS, INC., Dallas, Texas.
- Developed 802.11b compliant physical layer
  - Shipped over 100M units in 2nd generation of Intel's Centrino technology
  - Company backed by Cisco and Vantage Point Venture Partners
  - Acquired by Texas Instruments for \$300MM
- 1991–1995 **Intern and Engineer, Digital Signal Processing Group**, TEXAS INSTRUMENTS, INC., Stafford, Texas.
- Product engineering for TMS320C2X Digital Signal Processors
  - Applications engineering for TMS320C3X Digital Signal Processors

## Ph.D. Dissertation

Title *Turbo Codes: Bounds and Applications, Ph.D., August 1999.*

Supervisor Professor Chris D. Heegard

Committee Members Professors Toby Berger, Chris D. Heegard, Dexter Kozen, Venugopal V. Veeravalli and Stephen Wicker

## Masters Thesis

Title *Topics in Turbo Coding, M.S., May 1997.*

Supervisor Professor Chris D. Heegard

## Fundraising

- 2010-2016 **\$10M Series A**, Palomar Ventures, Biscotti Inc.
- 2009, 2016 **\$1.35M Seed Investment**, Texas Emerging Technology Fund, Wham! Inc.
- 2008 **\$50k Grant**, Allen Economic Development Center, Wham! Inc.

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- 2008 **\$420k Seed Round**, Private Individual Investors, Wham! Inc.
- 2007 **\$5M Debt Line**, Triple Point Capital, for WiQuest Communications, Inc.
- 2007 **\$23M Series C**, Lead by Adams Street Capital, WiQuest Communications, Inc.
- 2006 **\$18M Series B**, Lead by Sequoia Capital, WiQuest Communications, Inc.
- 2005 **\$50k Grant**, Allen Economic Development Center, WiQuest Communications, Inc.
- 2004 **\$15M Series A**, Menlo Ventures, Palomar Ventures and iD Ventures America, WiQuest Communications, Inc.
- 2003 **\$827k Seed Round**, Private Individual Investors, WiQuest Communications, Inc.

## Computer Skills

- Languages C, C++, Fortran, Python, Pascal, Java, Verilog, VHDL, BASIC, MATLAB, L<sup>A</sup>T<sub>E</sub>X, Spice, Perl, shell scripting, various assembly languages, Lisp, Swift.
- Standards and Protocols IEEE 802.3, IEEE 802.11, ADSL, HDSL, DOCSIS, Bluetooth, I<sup>2</sup>C, I<sup>2</sup>S, USB, CAN bus, HDMI, 3GPP, LTE, IS-95, EDGE, LTO, RS-232, HTTP, FTP, Telnet, Internet Protocol (IP), TCP, UDP, RTP, RTCP, SIP, STUN, TURN, ICE, CSMA/CD, CSMA/CA, ITU-T G.8031/8032, ITU, ITU-T J83B, MQTT, IEEE 802.15, IEEE 802.16, SSL, TLS, WEP, WPA, WPA2.

## Professional Activities

- 2006-2020 **External Advisory Committee, Texas A&M University, Department of Electrical and Computer Engineering**
- 2008-2010 **Board Member, TeXchange, Dallas Chapter** TeXchange is a non-for-profit organization dedicated to helping entrepreneurs succeed.
- 2003-2004 **Chairperson, IEEE 802.11n Task Group** Lead committee of over 300 engineers through initial stages of standardization of data rate enhancements in excess of 100 Mbps
- Jan. 2002 **IEEE 802.11 Meeting Organizer and Host, Wyndham Anatole, Dallas, Texas**
- 2000-2003 **Chairperson, IEEE 802.11g Task Group** Lead committee of over 200 engineers to set standard for 54 Mbps data rates in the 2.4 GHz band in a fashion that is backward compatible with IEEE 802.11b. Standard become the basis for the most widely used version of Wi-Fi.
- Sept. 1999 **IEEE 802.11 Meeting Organizer and Host, Hilton Sonoma County, Santa Rosa, California.**

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- 1999 **Chairperson, IEEE 802.11g Study Group** Lead committee of 20 engineers to set project requirements for IEEE 802.11g.
- 1991-Present **IEEE Member**

## Awards

- 2012 **CES Innovation Award for the Biscotti TV Phone**
- 2008 **CES Innovation Award for Wireless Digital Video Technology** This high-speed digital video technology shipped in notebook computers from Toshiba.
- 2006 **Intel Technology Innovation Award** Awarded to WiQuest for innovations in Wireless USB technology.
- 2003 **PC Magazine Technology Excellence Award for IEEE 802.11g** This award was bestowed on the IEEE 802.11 Working Group and the Wi-Fi Alliance for the protocols incorporated in the IEEE 802.11g standard under my leadership.
- 2002 **Texas Instruments Senior Member Technical Staff**
- 1997-1998 **Intel Foundation Graduate Fellowship Award**

## Consulting & Litigation Services

- 2021–Present ***SB IP Holdings LLC v. Vivint Smart Home, Inc., No. 4:20-cv- 00886 (E.D. Tex.)***, Retained via Vivint’s counsel, Maschoff Brennan. Case relates to security systems.
- 2021–Present **Qualcomm Inc.**, Retained via Qualcomm’s counsel, Norton Rose Fulbright for consulting related to Wi-Fi.
- 2021–Present ***AGIS Software Development LLC v. Lyft Inc., et al., Case No. 2:21-cv-00072-JRG (E.D. Tex.)***, Retained by Lyft’s counsel, Baker Botts LLP.
- 2021–Present ***Intellectual Ventures LLC I and II v. Hewlett Packard Enterprise Company, Case No. 6:21-cv-226 (W.D. Tex.)***, Retained by HPE’s counsel GreenBerg Traurig, LLP. Case involves U.S. Patent No. 6,816,464 and VOIP.
- 2021–Present ***WSOU v. NEC***, Retained by NEC’s counsel, Jones Day. Western District of Texas, Case Nos. 6:20-cv-00923-ADA, -00924, -00925, -00926, -00927.
- 2021–Present ***Parker Vision v. Hisense and TCL***, Retained by Hisense and TCL via their counsel Kilpatrick Townsend & Stockton LLP. Generally related to direct conversion receivers.
- 2021–Present ***In the Matter of Certain LTE-Compliant Cellular Communication Devices, ITC Inv.No. 337-TA-1253***, Retained by Samsung via their counsel Quinn Emmanuel Urquhart & Sullivan, LLP..

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- 2021–Present **OnePlus Technology (Shenzhen) Co., Ltd. matter**, Retained via their counsel Morgan Lewis & Bockius LLP. Technologies relate to random access channels, power adjustment, qualify feedback, battery charge estimation, link adaptation, and buffer reporting.
- 2021–Present **Wi-Fi Matter**, Retained for Wi-Fi patent owner via their counsel Hiem, Payne & Chorush, L.L.P. Matter relates to IEEE 802.11 and Wi-Fi patents.
- 2021–Present **Intelligent Agency v. NeighborFavor, Inc.**, Relating mobile applications. Retained via NeighborFavor’s counsel, Baker Botts LLP.
- 2021–Present **FK Ironworks, et al.**, Related wireless power charging systems.
- 2020–Present **TrickleStar v. American Conservation Group**, Related to efficient power distribution technology.
- 2020–Present **MediaTek Inc. v. NXP**, Related to Wi-Fi.
- 2020–Present **Intelligent Agency v. 7-Eleven Inc.**, Relating mobile applications. Retained via 7-Eleven’s counsel, Baker Botts LLP.
- 2020–Present **Caltech**, Related to Wi-Fi and error correction coding.
- 2020–2021 **Quartz Auto Technologies LLC v. Uber Technologies, Inc., Case No. 1:20-cv-00720 (W.D. Tex.)**, Retained by Uber via their counsel Gibson Dunn & Crutcher LLP.
- 2020–Present **Blitzsafe Texas, LLC v. Fiat Chrysler Automobiles, N.V. et al., E.D. Tex.**, Retained by FCA US LLC and Maserati North America, Inc. via their counsel Venable LLP. Matter relates to use of USB and Bluetooth in automobiles.
- 2020–2021 **Blitzsafe Texas, LLC v. Navistar, Inc. and Navistar International Corp., Case No. 2:19-cv-00403-JRG (E.D. Tex.)**, Retained by Navistar via their counsel DLA Piper. Matter relates to use of USB and Bluetooth in automobiles.
- 2020–2021 **Blitzsafe Texas, LLC v. General Motors, LLC, Case No. 2:19-cv-00377-JRG (E.D. Tex.)**, Retained by GM via their counsel Quinn Emanuel. Matter relates to use of USB and Bluetooth in automobiles.
- 2020–Present **Traeger v. GMG Grills in ITC case**, Relating to Wi-Fi features.
- 2020–Present **Cornell University**, Relating to communication networks, specifically inventions related to Wi-Fi.
- 2020 **Castlemorton Wireless, LLC v. Juniper Networks, Inc., Civil Action No. 6-20-cv-00026 (W.D. Tex.)**, Retained for Juniper via their counsel Covington & Burling LLP. Matter relates to IEEE 802.11 products.
- 2020–Present **Essential WiFi v. MediaTek, et al., Civil Case No. 6:20-cv-225 (W.D. Tex.)**, Retained for by MediaTek via their counsel Quinn Emanuel. Also retained by Texas Instruments and Acer. Related to Wi-Fi including MIMO and wide channels.

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- 2020–Present ***DeCurtis LLC v. Carnival Corp.*, Case No. 6:20-cv-00607 (M.D. Fla) and *Carnival Corp. v. DeCurtis Corp., et al.*, Case No. 1:20-cv-21547 (S.D. Fla)**, Retained for DeCurtis LLC via their counsel Quinn Emanuel.
- 2020–Present **Samsung Electronics Co., Ltd**, Retained for Samsung via their counsel Quinn Emanuel. Related to analysis of patent infringement in cellular phones, e.g. antenna subsystems.
- 2020–2021 ***Huawei Technologies Co. Ltd. v Verizon Communications, Inc., et. al.*, 6:20-cv-00090 (E.D. Tex.**, Retained by Verizon via their counsel Quinn Emanuel. Case related to network communication systems including fiber rings. Case also related to ITU-T Recommendations G.709 and G.8032. Patents Case settled mid-trial the day before I was to testify. Invalidity and non-infringement reports submitted in case and deposition testimony provided. Worked on U.S. Patent No. 8,995,253. Also submitted standards report regarding violations of ITU-T patent policy.
- 2020–Present ***KAIFI LLC v. AT&T Corp. et al.*, Civil Case No. 2:19-cv-138 (E.D. Tex.)**, Retained for AT&T via their counsel Gibson, Dunn & Crutcher LLP.
- 2020 ***Castlemorton Wireless, LLC v. T-Mobile US, Inc. et al Civil Action No. 6:20-cv-00027-ADA (W.D. Tex.)***, Retained for T-mobile via their counsel McGuireWoods LLP.
- 2020–Present ***Sonos v. Google***, Retained for Google via their counsel Quinn Emanuel. Deposition and ITC trial testimony.
- 2020–Present ***Sisvel International S.A. and 3G Licensing S.A. v. Cradlepoint, Inc.*, Civil Case No. 1:19- CV-1142-MN (D. Del.)**, Retained for Cradlepoint, Inc. and Sierra Wireless, Inc. via their counsel Perkins Coie LLP.
- 2020–2021 ***LG Electronics, Inc. v. Hisense Electronics Manufacturing Company America*, Civil Case No. 2:19-cv-9474 (C.D. Cal.)**, Retained for Hisense via their counsel Covington & Burling LLP.
- 2020 ***Blitzsafe Texas, LLC v. PACCAR Inc.***, Retained for PACCAR via their counsel Baker Botts LLP.
- 2020 ***Castlemorton Wireless, LLC v. Sprint Corporation, et al. (W.D. Tex.)***, Retained for Sprint via their counsel McGuireWoods LLP. Patent at issue is US 7,835,421. The accused products are alleged “to practice IEEE 802.11b and/or IEEE 802.11g” standards.
- 2019–Present ***Wapp Tech Ltd., et al. v. Seattle SpinCo, Inc., Micro Focus LLC, et al. (“Micro Focus”)* (E.D. Tex., D. Del.)**, Retained for Micro Focus by Gibson Dunn and Shelton Coburn. Patents at issue in case are US 9,971,678, 9,298,864, and 8,924,192 . Patents relate to emulation of mobile devices and application development. Deposition and trial testimony.

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- 2019 ***Blitzsafe v. Bosch (N. D. Tex.)***, Retained by Bosch via their counsel DLA Piper. Patents asserted against the use of USB and Bluetooth in vehicles.
- 2019–2021 ***Linksmart Wireless Technology LLC v. Panasonic Avionics Corp. (C. D. Cal.)***, Retained by Panasonic Avionics via their counsel Haynes & Boone LLP. Case related to Wi-Fi, Internet access on airplanes, satellite communications, DHCP, IEEE 802.3, gateways, redirection servers and proxies. Patent at issue was US RE46,459 to Ikudome and Yeung. Submitted experts reports. No deposition testimony. No trial. Case No. 8:18-cv-00662-AG-JDE (C. D. Cali.).
- 2019–2021 ***United Access Technologies, LLC v. CenturyTel Broadband Services LLC and Qwest Corporation (D. Del.)***, Retained by defendants, collectively “CenturyLink,” via their via their counsel Duane Morris LLP. Patents at issue were U.S. 5,844,596, 6,243,446 and 6,542,585. Accused products were splitterless ADSL systems with POTS. Wrote non-infringement report. Court found non-infringement on motion for summary judgement. No trial nor trial testimony..
- 2019–Present ***Uniloc v. Blackberry (N. D. Tex.)***, Retained by Blackberry via their counsel Baker Botts LLP. Case No. 3:18-cv-03068-N (N.D. Texas) Patents in-suit are US6,868,079, US6,993,049, US7,020,106 and US7,167,487.
- 2019 ***Traxcell v. Sprint and Verizon (E. D. Tex.)***, Retained by Sprint via their counsel McGuireWoods. Retained by Verizon via their counsel Holland & Knight LLP. Patents deal with network tuning, location determination and navigation. Patents at issue are US Patents 8,977,284, 9,510,320, 9,642,024 and 9,549,399. Wrote invalidity reports for Sprint and Verizon, and wrote a non-infringement report for Verizon. Depositions taken. No trial testimony, since cases settled shortly before trial due to granted summary judgement motions on non-infringement.
- 2019 ***Blitzsafe v. Daimler (E. D. Tex.)***, Retained by Daimler via their counsel Quinn Emmanuel. Patents asserted against the use of USB and Bluetooth in vehicles.
- 2018–2020 ***Sol IP v. Sprint (E. D. Tex.)***, Retained by Sprint via their counsel McGuireWoods. Sol IP, LLC v. Sprint Corporation, et al., Civil Action No. 2:18-cv-00527 (E.D. Tex.).
- 2018–2019 ***Parity Networks v. Hewlett Packard Enterprise Co. (E. D. Tex.)***, Retained by HPE via their counsel Morgan Lewis. No reports, testimony nor depositions. HPE was dismissed from the case in March 2019 for unknown reasons.
- 2018–Present ***Uniloc v. AT&T (E. D. Tex.)***, Retained by AT&T via their counsel Baker Botts LLP. Matter pertains to LTE License Assisted Access (LAA).

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- 2018–2019 ***Bell North Research LLC v. Kyocera Corp. (S. D. Cali.)***, Retained by Kyocera. via their counsel Jones Day. Bell Northern Research LLC v. Kyocera Corp. Case No. 3:18-cv-1785 (S.D. Cal.).
- 2018–2019 ***Koninklijke KPN N.V. v. Sierra Wireless, Inc., et al. (D. Del.)***, Retained by Sierra Wireless Inc. via their counsel Kirkland & Ellis LLP. Matter involves ETSI and TIA licensing obligations. Expert report(s) submitted.
- 2018–2019 ***Hewlett Packard Enterprise Company v. ChriMar Systems, Inc.***, Retained by Hewlett Packard Enterprise Company via their counsel Morgan Lewis. Matter involves *inter partes* review of certain US Patents. Matter relates to power-over-ethernet (PoE). Patents owned by ChriMar Systems include 8,155,012, 8,942,107, 8,902,760, 9,019,838, 9,049,019, and 9,812,825.
- 2018–2020 ***Hera Wireless and Sisvel v. Belkin Int'l. and ARRIS Group***, Retained by Belkin International and ARRIS Group via their counsel Duane Morris LLP. Case Nos. 1:17-cv-00948-RGA and 1:17-cv-00949-RGA. No reports, declarations nor deposition testimony. Case resolved before trial.
- 2018–2020 ***Blackberry v. Facebook***, Retained by Blackberry in patent case dealing with text messaging and user interfaces.
- 2018–Dec ***Fundamental Innovation systems v. ZTE Corporation***, Retained in USB  
2019 power case by ZTE via their counsel McDermott Will & Emory.
- 2018 ***Intel Corporation***, Retained via Intel's counsel, Kirkland & Ellis, in matter related to Wi-Fi in notebook computers.
- 2017–2018 ***Intel Corporation***, Retained via Intel's counsel, Weil, Gotshal & Manges LLP. Matter relates to patents asserted against MIMO and/or beamforming in wireless OFDM communication systems.
- 2017–2018 ***PrefNet v. Sprint***, Working with Sprint's counsel, McGuireWoods. Case relates to management of bandwidth in network servers.
- 2017–Present ***XR Communications, LLC, dba Vivato Technologies v. Cisco Systems, Inc., 2:17-cv-02951 (C.D. Cal. 2017)***, Patent case regarding US Pat. No. 6,611,231 and adaptive antenna arrays. Retained via Kirkland & Ellis LLP.
- 2017–2018 ***Sharp Corporation***, Retained by Sharp's counsel, K&L Gates. Matter concerns intellectual property and Wi-Fi. No deposition nor trial testimony.
- 2017 ***Harmon International Industries***, Retained by Harmon's counsel, McDermott, Will & Emory. Matter relates to car stereos and audio equipment in vehicles. No deposition nor trial testimony. .
- 2017-2018 ***Wistron Corporation***, Retained by Wistron's counsel, JW Law Group. Matter relates to alleged Wi-Fi patents.

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- 2017–2019 **Blitzsafe v. Mitsubishi**, Retained via Mitsubishi Electric Corporation’s counsel, Pillsbury, Winthrop, Shaw, Pittman LLP. Case relates to the use of Bluetooth and USB in vehicles. No deposition nor trial testimony.
- 2016–2017 **Mtel v. Google**, Retained by Quinn Emanuel for Google. Case is a patent infringement case regarding US Patents 5,809,428, 5,894,506, 5,581,804 and 5,754,946. Case no. is 2:16-cv-00002 in E.D. Texas Marshall Division.
- 2016–2017 **SPH America LLC v. Huawei Technology Co. Ltd.**, Retained by Foley and Lardner LLP for Huawei. Case no. is 13-cv-2323-CAB-KSC (S.D. Cal). Draft invalidity report written but not served. No deposition nor trial testimony. Huawei joined JDG with Blackberry.
- 2016–2017 **IV v. AT&T**, Retained by AT&T. AT&T’s counsel is Baker Botts. Case is a patent infringement case related to DSL. No depositions nor trial testimony at this time.
- 2016–2019 **Fujifilm v. Sony**, Retained on half of Fujifilm by their counsel Baker Botts. Cases relate to alleged standards and LTO data storage products. The matters are being heard in the ITC and in an associated district court case. Deposition and trial testimony.
- 2016–2017 **Blitzsafe v. Honda**, Retained via Honda’s counsel, Jones Day. Case relates patent infringement and use of Bluetooth and USB in vehicles. Deposition take. No trial testimony.
- 2016 **Network-1 vs. Dell Inc.**, Retained via Dell’s counsel K&L Gates in a patent litigation related to power over Ethernet. No depositions nor trial testimony.
- 2016–Present **California Institute of Technology (Caltech) vs. Broadcom Corporation and Apple Inc.**, Retained via Caltech’s counsel, Quinn Emanuel. Case relates to use of forward error correction in Wi-Fi products. Technology tutorial presented to district court. Expert reports submitted. Testimony provide to court at various hearings. Testified on infringement and technical value of patents at trial in January 2020. Was sole expert witness for Caltech. Jury found Apple and Broadcom infringe and awarded \$1.1B in damages.
- 2015–2016 **California Institute of Technology (Caltech)**, Analysis of IEEE 802.11 patents. No depositions nor trial testimony.
- 2015–2016 **Wistron Corporation**, Retained to analyze certain communication system patents in the LTE space. No depositions nor trial testimony.
- 2015–2016 **Wistron Corporation**, Retained via Wistron’s counsel, K&L Gates, to perform analysis related to Wi-Fi. No depositions nor trial testimony.
- 2015–2016 **LSI v. Funai**, Retained by Baker & Hostetler to provide services in connection with LSI Corp. et al. v. Funai Electric Co. Ltd. Case relates OFDM patent asserted against Wi-Fi products. No deposition nor trial testimony.

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- 2015–2016 **Mtel v. Blackberry**, Retained by Blackberry via their counsel McDermott Will & Emery LLP. Patent case related to pagers. Patents asserted against mobile phones. Deposition taken. No trial testimony.
- 2015 **Ericsson v. Apple**, Retained by Apple via their counsel Fish & Richardson. Patent case related to Wi-Fi and cellular. Deposition and trial testimony in ITC case..
- 2015 **Antennatech LLC v. Mercedes-Benz USA LLC**, Retained by Mercedes-Benz via their counsel Quinn Emanuel Urquhart & Sullivan, LLP. Patent case related to Wi-Fi inside vehicles. No deposition nor trial testimony..
- 2015 **Samsung**, Retained via Williams & Connolly LLP on behalf of their their client Samsung. Case relates to cross license between two parties, including access by Samsung to Nokia’s Wi-Fi patent portfolio. No deposition nor trial testimony.
- 2015 **Cablevision v. Verizon**, Retained via Kirkland & Ellis on behalf of their client Verizon. Matter relates to false advertising claims tied to use of IEEE 802.11ac routers. No deposition. Testified at trial.
- 2014 **Blitz Stream Video LLC**, Retained as consultant related to portfolio of video patents. No deposition nor trial testimony.
- 2014-2016 **SPH America v. Blackberry Limited**, Retained by Blackberry via their counsel Quinn Emanuel Urquhart & Sullivan, LLP. No deposition nor trial testimony.
- 2014-2015 **CSIRO v. MediaTek**, Nokia, Texas Instruments, Realtek and Barnes & Noble via a joint defense group including Covington & Burling LLP. Serving both as expert for JDG and 30(b)(6) witness for Texas Instruments. No trial testimony.
- 2014-2018 **ChriMar v. Cisco**, Retained by Cisco via their counsel Kirkland & Ellis. Matter relates to power over Ethernet. Deposition. No trial testimony.
- 2014-2016 **Intellectual Ventures v. CenturyLink, et al.**, Retained by CenturyLink via their counsel O’Melveny & Myers LLP. No deposition nor trial testimony.
- 2013-2015 **Intellectual Ventures v. Canon Inc., et al.**, Retained by Canon Inc, et al. via their counsel Quinn Emanuel Urquhart & Sullivan, LLP. Deposition. No trial testimony.
- 2013-2017 **Intellectual Ventures v. AT&T Mobility LLC, et al.**, Retained by Sprint Spectrum LP via their counsel McGuireWoods LLP. Case relates to security in IEEE 802.11 networks. No deposition nor trial testimony.
- 2014 **NXP v. Blackberry**, Services retained by Blackberry via their counsel McDermott Will & Emery. No deposition. Testified at trial..
- 2013-2014 **Realtek Semiconductor Corp v. LSI Corporation et al.**, Retained by Realtek Semiconductor Corp via their counsel ReedSmith. Deposition and trial testimony.

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- 2013-2017 **CSIRO v. Cisco System Inc.**, Retained by Cisco via their counsel Duane Morris. Deposition and trial testimony..
- 2013 **Cisco Systems, Inc. and Motorola Solutions, Inc. v. Innovatio IP Ventures LLC**, Retained by Kirkland and Ellis on behalf of Cisco Systems, Motorola Solutions, Inc. and NETGEAR. Deposition and trial testimony.
- 2013 **Wi-LAN v. HTC, et al.**, Retained HTC Corporation, HTC America Inc., and Exedea, Inc. via their counsel Sheppard Mullin Richter & Hampton, Novatel via their counsel K&L Gates, and Sierra Wireless via their counsel Nixon Peabody. Expert reports also filed on behalf of other defendants including Apple and Alcatel Lucent. Deposition. Case settled prior to trial.
- 2012-2013 **Ericsson, et al. v. D-Link, et al.**, Retained via Intel via their counsel Kirkland & Ellis. Deposition and trial testimony.
- 2011-2013 **Mosaid Technologies Incorporated v. Dell, Inc. et al.**, Retained by Intel via their counsel WilmerHale, and retained by Marvell via their counsel Quinn Emanuel Urquhart & Sullivan, LLP. No deposition. Case settled prior to trial..
- 2011-2012 **Broadcom Corporation and Atheros Communications, Inc. vs. Commonwealth Scientific and Industrial Research Organization.**, Retained by Broadcom via Potter Minton. Deposition. Case settled prior to trial.
- 2010-2011 **Wi-LAN vs. RIM, PCD, Motorola, LG, et al.**, Was an expert witness for the defense. Retained by PCD and a major Korean cell phone manufacturer. PCD distributes phones made by HTC. Deposition. No trial testimony.
- 2009-2011 **Wi-LAN vs. Acer, Intel, Broadcom, Atheros, Marvell, et al.**, Was expert witness for defense. Focused specifically on US Patent 5,282,222 related to OFDM technology. Served as expert related to wireless, the IEEE standards process and provided testimony related to damages. Retained by Intel, Broadcom and Marvell. Deposition. Case settled on the eve of trial.
- 2008-2009 **CSIRO vs. Intel, Broadcom, Microsoft, HP, Dell, D-Link, et al.**, Served as fact witness related to 802.11 standardization, rules, process and events related to the formation of the 802.11 standard. Testified at trial.

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## Recent Talks

- 8 March 2019 Texas A&M University Department of Electrical & Computer Engineering, Distinguished Speaker Series for Leaders & Innovators. Talk on LDPC error correction coding in the IEEE 802.11 standard.
- 21 July 2019 Duke University TIP program. Talk on the history of security in IEEE 802.11 with focus on cryptological errors made in WEP.

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## Community Service

- 27 Feb 2019 Southern Methodist University judge of business plans for entrepreneurship course.
- 2019 Official Scorekeeper for D-Bat Elite 13U Majors Boys Baseball Team.
- 2016-2018 Official Scorekeeper for NTX Eagles 10U-12U Majors Boys Baseball Team.
- 2017 Head Coach of Patriots 12U Boys Competitive Basketball in Allen Sports Association.
- 2013-2015 Head and Assistant Coaching Positions for 8U-9U Boys Competitive Baseball in Allen Sports Association.






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- 2009 Advocated and Succeeded in Moving Entire Grade of Elementary School Children from Temporary to Permanent Facilities.
- 2008 Advocated and Established After School Science Program at Local Elementary School.

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# **EXHIBIT B**

## **List of List of Materials Considered**

### **LIST OF MATERIALS CONSIDERED**

1. U.S. Patent No. 7,885,398 (“the ’398 patent”)
2. U.S. Patent No. 8,103,213 (“the ’213 patent”)
3. Prosecution History of the ’398 patent
4. Prosecution History of the ’213 patent
5. NEC’s Preliminary Claim Constructions
6. WSOU’s Preliminary Claim Constructions
7. Materials cited in this declaration

# **EXHIBIT C**

## **U.S. Patent No. 7,885,398**



US007885398B2

(12) **United States Patent**  
**Chandra et al.**

(10) **Patent No.:** **US 7,885,398 B2**

(45) **Date of Patent:** **Feb. 8, 2011**

(54) **MULTIPLE CRITERIA BASED LOAD BALANCING**

(75) Inventors: **Neeraj Chandra**, Ottawa (CA);  
**Gerardo Martin Espinosa**, Plano, TX (US)

(73) Assignee: **Alcatel Lucent**, Paris (FR)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1374 days.

(21) Appl. No.: **11/367,401**

(22) Filed: **Mar. 6, 2006**

(65) **Prior Publication Data**

US 2007/0206762 A1 Sep. 6, 2007

(51) **Int. Cl.**  
**H04M 7/00** (2006.01)

(52) **U.S. Cl.** ..... **379/221.01**; 379/221.05;  
379/221.07; 370/237; 370/238.1; 709/235

(58) **Field of Classification Search** ..... 370/238;  
379/221.01–221.04

See application file for complete search history.

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*Primary Examiner*—Fan Tsang

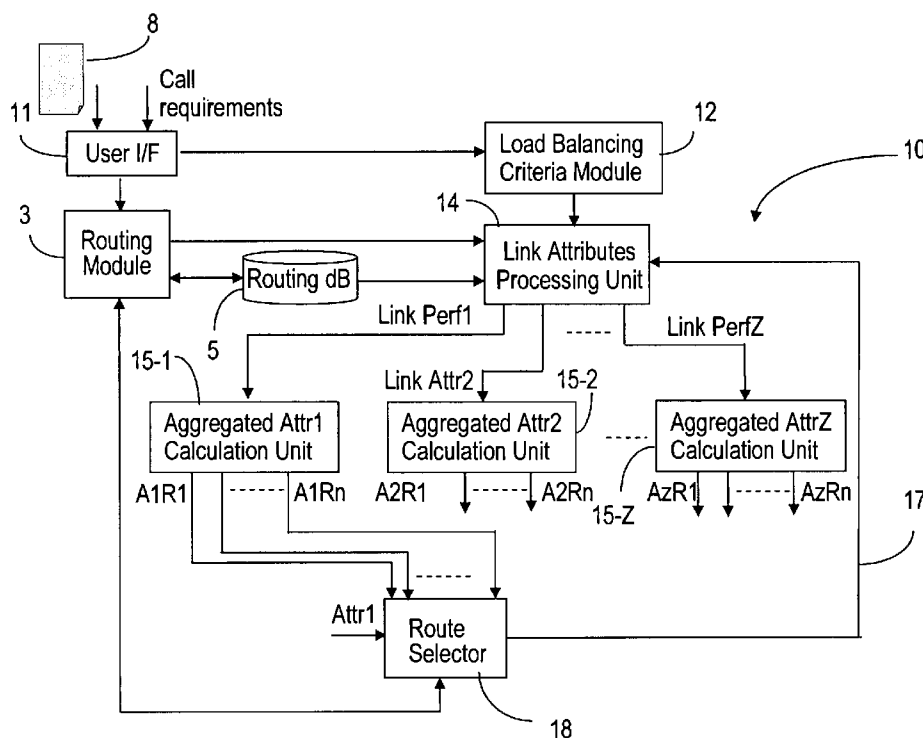
*Assistant Examiner*—Ibrahim Sharifzada

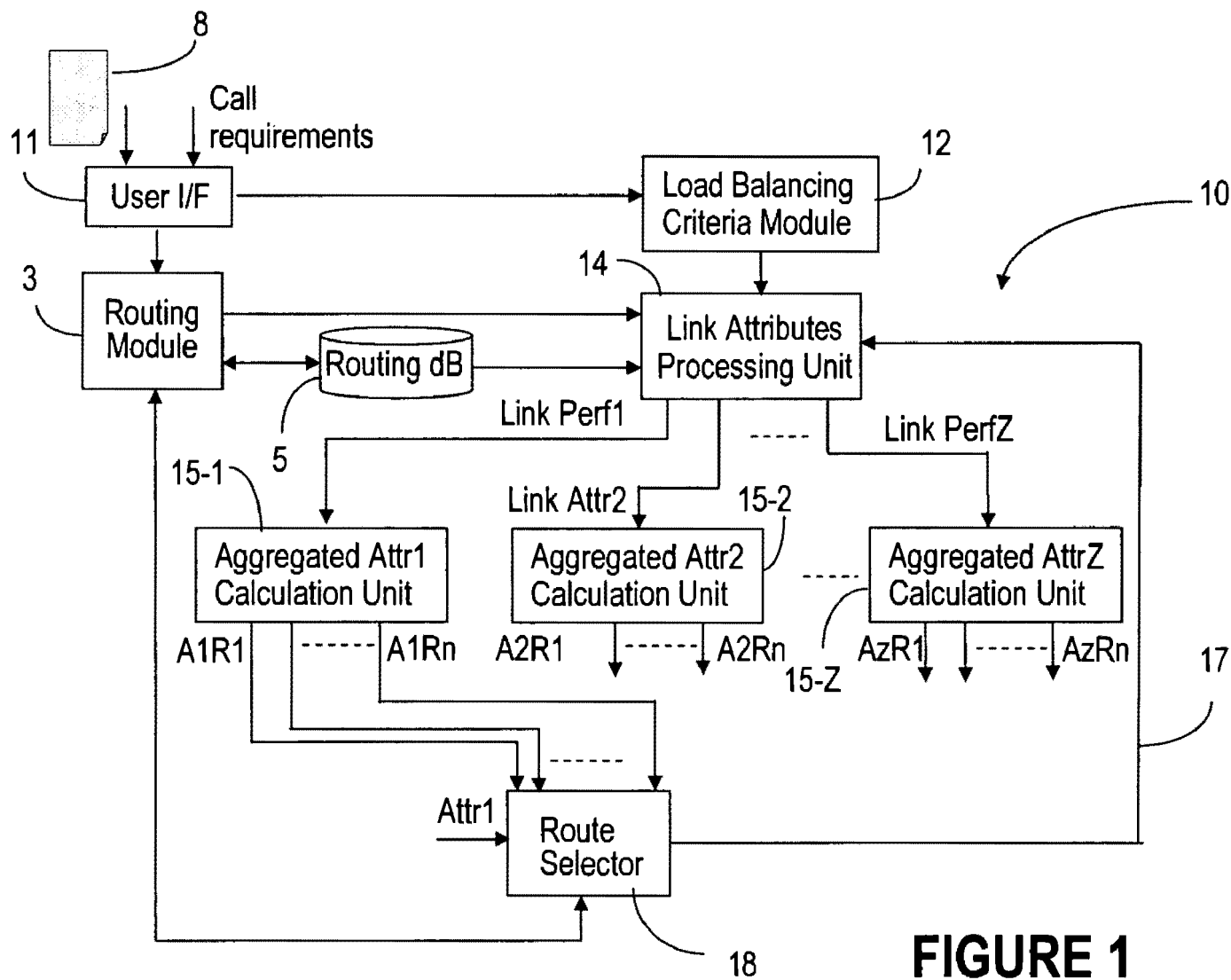
(74) *Attorney, Agent, or Firm*—Kramer & Amado, P.C.

(57) **ABSTRACT**

This invention provides the ability to load balance calls in a communications network using a certain criterion, such as a user-specified call priority, or the call service category. The method is applied when selecting a route for a new call or for re-balancing the calls across a network. When the user-specified call priority is used, the aggregated number of calls with the same priority or service category is calculated for all possible routes the new call may use. The aggregated number of calls is then divided by the number of hops in the respective routes; the route with the smallest ratio is selected for the new call. Re-balancing is performed by re-routing the calls in such a way as to obtain a similar number of calls of the same priority, or service category along all possible routes.

**15 Claims, 3 Drawing Sheets**



**FIGURE 1**



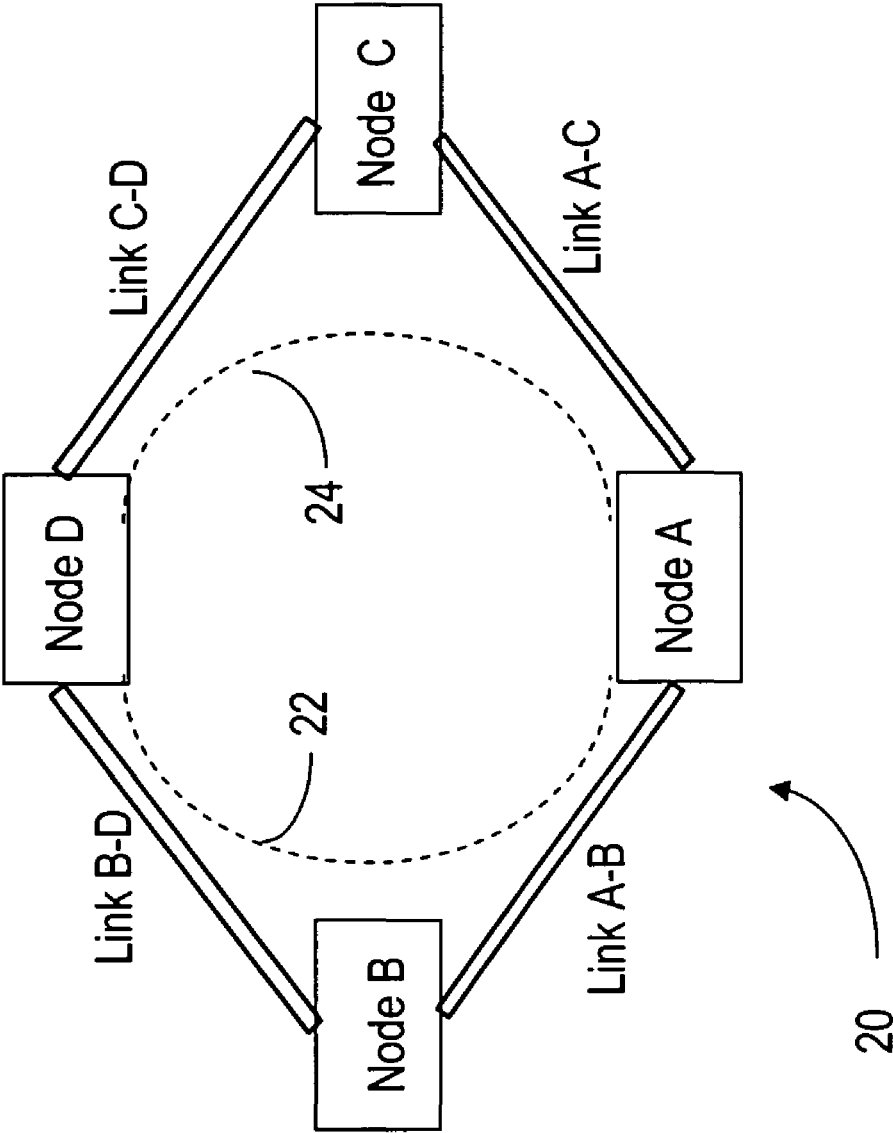


FIGURE 2

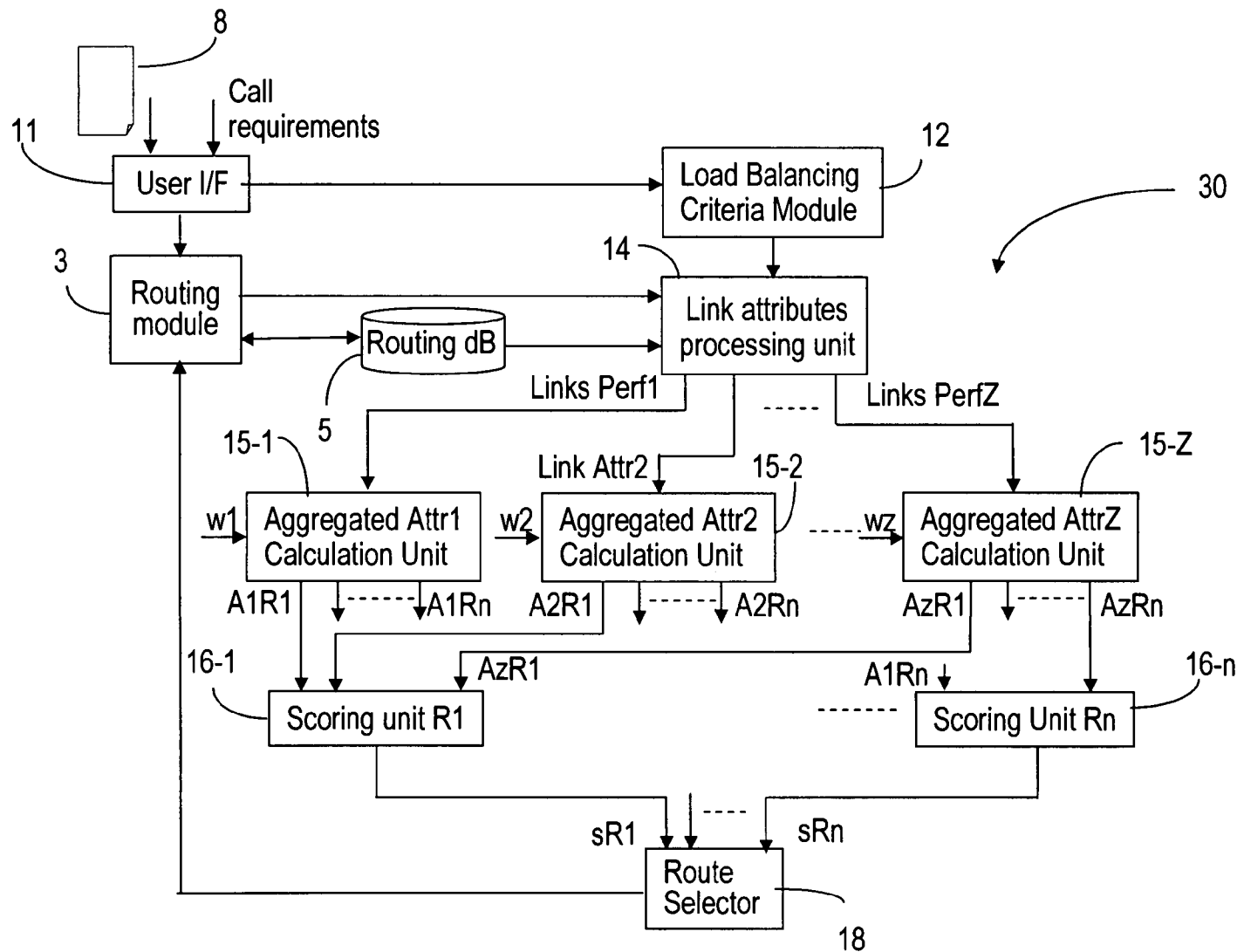


FIGURE 3

US 7,885,398 B2

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**MULTIPLE CRITERIA BASED LOAD  
BALANCING**

## RELATED US PATENT APPLICATIONS

Co-pending U.S. patent application Ser. No. 11/367,402, entitled "Prioritized connection load balancing, Chandra et al., filed on even date, and assigned to Alcatel.

## FIELD OF THE INVENTION

The invention is directed to a method and apparatus for load balancing the calls within a switched network based on a user-specified set of criteria, and in particular to PVC (per-

## BACKGROUND OF THE INVENTION

PVC switched digital communications networks such as e.g. ATM (Asynchronous Transfer Mode) networks are widely used for high-speed broadband data transport. In this type of networks, once a call is established, it will use generally the same route for the life, unless a physical link of the route becomes unavailable, in which case the call is rerouted. Various routing criteria are used for centrally provisioning communication sessions between users of such networks. Some of the currently used criteria are cost of the route, number of hops along a route and bandwidth load of the respective route.

Since a communication network has at its disposal limited resources (link bandwidth and node processing capacity) to ensure efficient data transmission, efficient use of the resources is an important requirement. When traffic demand increases, a network may become congested, resulting in degraded network performance. On the other hand, for proper operation, a network must be implemented so as to avoid congestion. The simplest solution obviously is to increase the capacity of the network; however this solution is generally undesirable for evident reasons of costs. Other less obvious solutions in support of efficient network operation consist in applying preventive measures, of which the main one is load balancing. Load balancing attempts to fairly distributing the traffic over all the links of the network to avoid a local congestion in particular resources and to better utilize the resources across the network.

Currently, the most common criteria for load balancing are based on determining an aggregated BW (aggregated over multiple hops) for each possible route for a call, and selecting the route with the lowest aggregated utilization for a new call. This is for example described in the U.S. Pat. No. 6,697,333 (Bawa et al.) entitled "Bandwidth load consideration in network route selection", issued on Feb. 24, 2004 to Alcatel. The patent describes load balancing methods applicable to both new calls and existing connected calls, using bandwidth load as a selection criterion in addition to route cost and number of link hops in a route. Particularly, the method described in the patent selects the path (route) for a call from alternative paths having equal least cost, and then equal least number of link hops, a path having the less average bandwidth represented as an aggregate of bandwidth usage for each link hop.

The problem with this approach is that the users do not have any involvement in the routing of their calls. But, in order to successfully manage the traffic across a PVC switched digital network it is important not only to allocate sufficient bandwidth for each connection from the knowledge of the source characteristics and the network status, but also to take into account user-specified criteria. Such criteria may be the a user

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specified calls priority, that indicates the relative importance of calls in the network and ultimately the order in which calls can be eventually released or submitted to a degradation of their quality of service. Another criterion could for example be the service category of the calls, or combinations of the above criteria, applied in a specified order, or subsets of the above criteria, etc.

Thus, there remains a need to provide a route selection method that takes into consideration user-specified criteria.

## SUMMARY OF THE INVENTION

It is an object of the invention to provide a method of routing calls in a PVC switched digital network that alleviates totally or in part the problems associated with the current method of routing calls.

It is another object of the invention to provide a method of routing calls in a PVC switched digital network that performs load balancing of calls based on various user-specified criteria.

A further object of this invention is to provide a method of routing calls in a PVC switched digital network that takes into account user-specified call priorities for both new and existing calls, in order to perform a multiple criteria based load balancing.

Accordingly, the invention provides a method of routing calls across a communication network with per-call load balancing, comprising: a) identifying at least two possible alternate routes for a new call; b) determining a route performance value for each the possible route, for a call attribute corresponding to a user-defined load balancing criterion; and c) selecting a route for carrying the new call based on the route performance value.

The invention also provides a method of re-routing a call-in-progress established along a current route across the network between a source and a destination across a communication network, comprising: identifying at least an additional possible route for the call-in-progress between the source and destination; determining a route performance value for the current route and the additional possible route, based on a call attribute corresponding to a user-defined load balancing criterion; comparing the route performance values for the current route and the additional possible route, to determine a best route; and re-routing the call-in-progress along the best route.

According to a further aspect, the invention is directed to a system for load balancing calls between within a communication network using a user-defined load balancing criterion, comprising: a routing module for selecting a plurality of possible alternate routes between user-specified source and destination; a load balancing criteria module for establishing a call attribute based on the criterion defined over an user interface; a link attribute processing unit for determining a link performance value for each link of each possible route based on the call attribute; an aggregated attribute calculation unit for determining a route performance value for each possible route, based on the link performance values; and a route selector for selecting a route for a new call from the possible alternate routes, based on the route performance value.

Still further, the invention provides a system for load balancing calls between a source and a destination within a communication network, based on a set of user-defined criteria. The system includes a routing module for selecting all possible alternate routes between the source and the destination; a load balancing criteria module for establishing a set of call attributes based on the set of user-defined criteria received over an user interface; a link attribute processing unit

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for determining a link performance value for each link of each possible route and for each call attribute of the set; a plurality of aggregated attribute calculation units, each aggregated attribute calculation unit for determining a route performance value for a given call attribute of the set for all possible routes, based on the link performance values for the respective call attribute and the respective possible route; a scoring unit for each possible routes, each scoring unit for providing a route score, based on the route performance for each call attribute of the set; and a route selector for selecting a route for a new call to be routed between the source and destination, based on the route score.

Advantageously, with the method of the invention, the calls are distributed across the network according to both the specific network configuration and user-specified criteria. This approach results in prioritizing the calls as desired by the users, a better failure response, lower costs to the users. Reducing the effects of service outages on high priority connections is a valuable feature from both the customers' and service provider's point of view. Higher cost routes may for example be assigned to carry high speed traffic of lower priority, since such routes may not be fully protected, while high priority calls may be routed on shorter paths, with high redundancy, as specified by the respective user. Or, the service provider and the users may decide to route the calls based on load balancing cable utilization aggregated over multiple hops, before or after applying to route selection the user specified criteria.

Another benefit of this approach is that the operator has more control over how calls are distributed across the network, to best fit customer's needs with the network capabilities.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of the preferred embodiments, as illustrated in the appended drawings, where:

FIG. 1 shows the block diagram of the load balancing system according to the invention;

FIG. 2 shows a four nodes network for providing examples of load balancing method of the invention, for various criteria and sub-sets of criteria; and

FIG. 3 shows the block diagram of the load balancing system according to another embodiment of the invention.

#### DETAILED DESCRIPTION

The invention described herein is best suitable for load balancing in PVC switched digital networks (such as an ATM network) and is preferably implemented in the networks equipped with a network management system (NMS). A PCV is a connection defined at subscription time and provisioned by the NMS. The invention might also be implemented at a switch level for soft permanent virtual connections (SPVC). A SPVC is a signaled PVC, which is set up on demand via a signaling protocol, and automatically re-established after a system restart.

The method and system described here use an aggregated load balancing approach based on various sets of criteria. Call routing or/and re-routing may be performed on a per-call basis as well as at the network level (applied to all calls in that network).

FIG. 1 shows the block diagram of the load balancing system according to the invention. The term "route" is used to define a physical path between a source and a destination,

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specifying all intermediate nodes (hops) of the respective communication network. The term "link" is used to define the portion of the route between two consecutive nodes along the route. The term "call" is used here for a path (facility) across the switched network between a source and a destination established by a set of cross-connections expanding one or more network elements. A call can be routed along a plurality of physical routes/paths, referred here as "possible routes".

A call is also defined by one or more attributes. An example of a user-specified call attribute (or a user-specified attribute) is the call priority, or a call service category, call bandwidth, etc. Attributes of a call may also be specified by the operator, derived from his/her knowledge of on-going events, etc. It is to be noted that the attributes specified above are only by way of example and that the invention is not limited to the above listed attributes. The attributes are denoted in the following with Attr1, Attr2, . . . AttrZ; all call attributes irrespective if they are user (client or operator) specified or resulting from network constraints are referred here collectively as "call attributes" or "attributes".

According to the invention, a user may specify a number of attributes to be used for load balancing; in which case these attributes are referred to as "criteria".

As seen in FIG. 1, the load balancing system 10 includes a load balancing criteria module 12, a link attribute processing unit 14, a plurality of aggregated attribute calculation units 15 and a route selector that are used for applying the load balancing criteria for route selection. FIG. 1 also shows a user interface 11 for enabling a user to specify the call requirements, such as call source and destination, bandwidth, preferred routing restrictions, etc., to a routing module 3 present at the node, for enabling the routing module 3 to prepare a list of possible paths that satisfy these requirements.

According to the invention, the user can also specify through a configuration form 8 which criteria system 10 should use for load balancing, and the order in which to look at these criteria. Unit 12 processes the data from the configuration form 8 and configures system 10 accordingly. Namely, unit 12 provides link attributes processing unit 14 with the criteria to be used, and the order of their applicability.

According to the invention, the routing module 3 selects the possible routes for the respective call based on network configuration information and the current network map stored in a database 5. The possible routes are denoted with R1 to Rn in FIG. 1. Database 5 may store for example data derived from the current network SW configuration, HW configuration, such as the number of the nodes along each selected possible route, the processing power (e.g. switching capacity/maximum allowed bandwidth, number of connections allowed) of the nodes, the type of the links (fiber, cable, wire, wireless, the current state, and the length, etc., which all are taken into consideration when the possible routes are calculated. The number of nodes (hops) is used for calculating average values, as seen later. The cost of a link is defined by a user and it is used for calculating the route cost. Other data may be stored in database 5, which may be used as selection criteria for the path.

Routing module 3 may be enhanced with the capability of first selecting from the possible routes provided by the routing module only the routes that have the lower cost, or the lower number of hops, etc. These design options may simplify the load balancing process on the expense of a less precise balancing.

The link attributes processing unit 14 receives the list with the possible routes for the call of interest from routing module 3, the selection criteria from load balancing criteria module 12, and also receives from database 5 the link attributes speci-

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fied by the selection criteria. Link attributes processing unit 14 then determines a link performance value, denoted with Link Perf1 to link PerfZ on FIG. 1, for each link of a respective route and for the respective attribute Attr1 to AttrZ, and provides this link performance value to a respective aggregated attribute calculation unit 15-1 to 15-Z. For example, in case when bandwidth balancing is performed, link attributes processing unit 14 determines the bandwidth consumed by all calls-in-progress along each link of routes R1 to Rn and provides this link performance values to aggregated attributes calculation unit 15-1, along with the number of links on the respective routes. If load balancing based on call priority is performed, the link performance value provided by the link attributes processing unit 14 is the number of calls of that given priority (the priority of the new call) for each link of each of the routes R1 to Rn.

Each aggregated attribute calculation unit 15-1 15-i, to 15-Z is responsible with calculating an aggregated value of a respective attribute Attr1 to AttrZ for each possible route R1 to Rn; the aggregated attributes are denoted with AiRj, where i is the index of the aggregated attribute calculation unit (e.g. unit 15-i), and j is the index for a respective possible route. An aggregated attribute calculation unit performs a specific operation on the calls on each link of a respective route, which depends on the nature of attribute. For example, in case of bandwidth balancing, the total BW of a route is obtained by summing the link bandwidth received from unit 14. Or, the call priority aggregated attribute is obtained by adding the link calls received from unit 14 for the respective route. It is to be noted that the total number of aggregated attribute calculation unit may be less than the number of all possible attributes intended to be used by the system for load balancing. This is because some of the calculation units can be re-used for calculating aggregated attributes of similar nature. For example, the aggregated attribute calculation unit used for call priority can also be used for call service category.

Aggregated attribute calculation units 15 preferably average the aggregated attribute over the number of hops of that route. Averaging is however not necessary if the possible routes have the same number of links. To generalize, each unit 15-1 15-i, to 15-Z estimates the performance of the possible routes with respect to the respective attribute, referred here as route performance value; the method of assessing the route performance depends on the attribute.

A route selector 18 selects the route for a new call based on the route performance with respect to a certain criteria, by comparing the route performances of all possible routes and selecting the route with the best performance value; the definition of the best performance also depends on the attribute. For example, for the bandwidth attribute, the route with the minimum bandwidth consumed obtains the best performance value; for the call priority attribute, the route with the minimum average number of calls of that priority gets the best performance value, etc.

FIG. 1 shows only connections for selection of a route based on the first attribute Attr1 for simplicity; it is to be understood that the other aggregated attribute calculation units interact in a similar way with unit 18.

Route selector 18 then passes the selected route to routing module 3 which then enables routing of the call on the selected route. The system shown in FIG. 1 enables load balancing based on a user-specified criterion, such as call service category, priority or bandwidth, etc.

It is to be noted that the load balancing criteria may be applied in sequence, such as first the route with the lowest cost is selected, then, if the route selector returns more than one selected routes with the same cost, the call priority criteria is

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next applied to these selected routes, and so on. In order to enable the system to repeat the selection for the next attribute, the identity of the selected routes for the respective attribute is provided to the link attribute processing unit 14, so as to enable unit 14 to repeat the process for the next criterion. For example, if the first load balancing criteria is priority and the second is service category, if two routes have the same priority, as determined by route selector 18 from the results received from aggregated attribute calculation unit 15-1, the identity of these routes is returned to unit 14, as seen at 17, to enable link attributes processing unit 14 to instructs a respective aggregated attribute calculation unit (e.g. unit 15-2) to determine the performance of these selected routes with respect to call service category.

FIG. 2 illustrates a few examples of the operation of the system 10 of FIG. 1 on a network 20 with four nodes A, B C and D. In this example, the nodes are connected as shown by links A-B, A-C, C-D and B-D; all links have in this example a maximum capacity of 100 Mbs. Also, for the sake of simplicity, we assume there could be only three service category levels, where Q1 is the highest, Q2 is the medium and Q3 the lowest. Similarly, we assume that there are five user specified priorities available, where P1 is the highest priority and P5 is the lowest. The links have calls traversing them with the attributes specified in the Table 1 below:

TABLE 1

	Link A-B	Link B-D	Link A-C	Link C-D
No. of calls (N)	5	10	8	8
BW Consumed	10 M	25 M	10 M	20 M
Priority (P)	3 × P5, 1 × P2, 1 × P1	4 × P5, 5 × P2, 1 × P1	3 × P5, 3 × P2, 2 × P1	3 × P5, 3 × P2, 2 × P1
Service category (Q)	1 × Q1, 2 × Q2, 2 × Q3	3 × Q1, 5 × Q2, 2 × Q3	1 × Q1, 5 × Q2, 2 × Q3	1 × Q1, 5 × Q2, 2 × Q3

A plurality of route selection scenarios are next described using network 20 of FIG. 2 and the link attributes from Table 1. In the following examples, route selection is performed for a new call that originates at node A for node D, using one or more load balancing criteria. There are two possible routes between nodes A and D, namely a first route, route R1, denoted with 22 along links A-B and B-D, and a second route, route R2, denoted with 24, along links A-C and C-D. For these examples the new call has a bandwidth of 5 M, a service category of Q1 and a priority of P1.

Scenario 1: Service Category as the Only Load Balancing Criterion

In the following scenario, the route for the new call is determined using as the load balancing criteria only the service category. Since the new call has service category Q1, which is the highest service category, we take into account all calls-in-progress with Q1, from all calls along the respective links of the possible routes R1 and R2. Using Table 1 and knowing that the number of hops on each route is 2, the average service category along these routes are:

For route R1:  $1 \times Q1$  (link A-B) +  $3 \times Q1$  (link B-D) = 4, which means that an aggregate of four calls have a service category of Q1. The service category average is determined by dividing the aggregate number of calls with a service category of Q1 to the number of hops along the route. This results in a service category average of 4: 2 hops = 2.

For route R2:  $1 \times Q1$  (link A-C) +  $1 \times Q1$  (link C-D) = 2, which means that an aggregate of two calls have a service category of Q1. The service category average is determined again by



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dividing the aggregate number of calls with service category=Q1 to the number of hops. This results in a service category average of 2: 2 hops=1. Route R2 is therefore selected for the new call as it offers a path with a smaller average number of service category calls belonging to the same category (Q1).

#### Scenario 2: User-specified Priority as the Only Load Balancing Criterion

Let's now attempt to connect the same call as in above Scenario 1, using only the call priority as the criterion. In this case, since the new call has a user-specified priority P1, which is the highest priority, we take into account the calls with P1 from all calls along the respective links of the possible routes R1 and R2. Using Table 1 above, and knowing that the number of hops on each route is 2, the route search results will be as follows.

For route R1:  $1 \times P1$  (link A-B) +  $1 \times P1$  (link B-D) = 2, which means that an aggregate of two calls have a priority of P1. The priority average is calculated by dividing the aggregate number of calls with priority P1 to the number of hops along that route. This results in a priority average of 2: 2 hops=1.

For route R2:  $2 \times P1$  (link A-C) +  $2 \times P1$  (link C-D) = 4, which means that an aggregate of four calls have a priority of P1. The priority average is again determined by dividing the aggregate number of P1 calls to the number of hops along route R2. This results in a priority average of 4: 2 hops=2. Route R1 is therefore selected for the new call as it offers a path with a smaller average number of P1 calls.

#### Scenario 3: Bandwidth as the Only Load Balancing Criterion

Since in this scenario the load balancing criterion is the bandwidth, the bandwidth average for the routes R1 and R2 should be determined, and the path with the minimum bandwidth utilization is selected. Using Table 1 above, and knowing that the number of hops on each route is 2, the route search results will be as follows.

For route R1: 10 M (link A-B) + 25 M (link B-D) = 35 M, which means that route R1 has an aggregate bandwidth of 35 M. The bandwidth average is determined by dividing the aggregate bandwidth to the number of hops along that route. This results in an average bandwidth of 35: 2 hops=17.5 M for route R1.

For route R2: 10 M (link A-C) + 20 M (link C-D) = 30, the average bandwidth is again determined by dividing the aggregate bandwidth to the number of hops along route R2. This results in an average bandwidth of 30: 2 hops=15 M. Route R2 is therefore selected for the new call as it offers a path with less average bandwidth consumed. It is to be noted that load balancing based on bandwidth may also be calculated by dividing the bandwidth utilized on a link by the link capacity (which is 100 M in our example) and aggregating these link bandwidth values for all links of the route. In the above example, this gives the same result:

For Route R1:  $10/100 + 25/100 = 0.35$

For Route R2:  $10/100 + 20/100 = 0.3$

It is to be noted that the above scenarios show simple examples for convenience; in addition, all describe use of only one criterion has to achieve load balancing. Nonetheless, the benefit of this approach is obvious, in that the calls are distributed across the network as desired according to the respective load balancing criterion.

Some operators might desire a higher level of control in terms of load balancing by specifying more than one criteria (e.g. number of calls, priority, service category, bandwidth, etc.) to achieve distribution of calls across their network. For

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example it might be desirable to pick a route that offers a higher number of calls of a given priority, if the bandwidth and service category averages are lower across that route. In this situation, a score may be calculated for each route, and the route with a better score is selected for the respective call.

FIG. 3 illustrates the block diagram of the load balancing system 30 according to another embodiment of the invention, where the system uses a set of criteria for load balancing. In this case, the user specifies a set of criteria to be used for load balancing; the user may specify the criteria set through e.g. a configuration form 8. As discussed in connection with the embodiment of FIG. 1, an aggregated attribute calculation units 15-1 to 15-Z provides a route performance value (e.g. A1R1 or AzRn) for each route R1 to Rn with respect to each attribute A1 to Az.

The load balancing system 30 is also provided with scoring units 16-1 to 16-n connected at the output of the aggregated attribute calculation units 15-1 to 15-n; there are n scoring units operating for n possible routes is n. Each scoring unit 16 calculates a score for a route for the criteria in the user-specified set, taking the respective route performances into consideration. As such, the number of scoring units operating at a certain moment varies with the number of possible routes available for that call.

A scoring unit 16-1 to 16-n compounds the route performances for all possible routes for a given attribute and provides an individual score denoted with sR1 to sRn. In the example in FIG. 3 the set of route performance values used by scoring unit 16-1 are established using call attributes A1 to Az; evidently more or less criteria may be used for scoring route performance. Also, FIG. 3 shows the scoring for route R1 only for simplicity.

It is also to be noted that system 30 also allows the operator/user to specify which attributes to use during path selection and also to determine their order. According to the invention, not only that a plurality of user-selected criteria or criteria subsets may be specified for load balancing, but also the order of applying the criteria may be changed. For example, load balancing using bandwidth may be considered first, possibly followed by hops and then cost. As an optional add-on the user can specify the ability to override a criterion (e.g. bandwidth) based on one or more criteria (e.g. service category, and bandwidth).

According to still another embodiment of the invention, the user can assign (again through a configuration form) weights to each criterion; these are denoted with w1 to wz in FIG. 3. The weights could have decimal values or can be integers. The weights are used for enabling more flexibility in load balancing, according to user or operator specified preferences.

#### Scenario 4: Load Balancing Using a Set of Criteria

An example for selecting a route using weighted load balancing criteria is given again for the network of FIG. 2, with the link attributes of Table 1. In the following, we will denote the load balancing scores for each criterion using capital letters N for the number of calls, BW for bandwidth, P for priority, and Q for service category; the corresponding lowercase letters are used for the weights attributed to the respective criterion. By way of example also, we use a score of 1 (1 point) for a route if that particular criterion is better along that route; otherwise the respective route gets 0 points. In this case, route R1 receives an individual score of 0 for the bandwidth criterion, since its average bandwidth is 17.5 M, while the average bandwidth of route R2 is only 15 M (see above Scenario 3). For the priority criterion, route R1 receives an individual score of 1, as it offers a path with a lower average

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number of P1 calls (see Scenario 2). Finally, for the service category criterion route R receives an individual score of 0, since route R2 offers a path with a lower average number of service category calls belonging to the same category Q1 (see Scenario 1).

Let's also assume that the weights used are whole number weights previously specified for load balancing, and that  $p=5$ ,  $bw=3$  and  $q=3$ .

The route score for route R1 is obtained by adding the individual scores weighted as indicated above:

$$\text{ScoreR1} = b \times BW = p \times P + q \times Q = 0 \times 3 + 1 \times 5 + 0 \times 3 = 5$$

Similarly, the route score for route R2 is obtained by adding the weighted individual scores.

$$\text{ScoreR2} = b \times BW = p \times P + q \times Q = 1 \times 3 + 0 \times 5 + 1 \times 3 = 6$$

Route R2 will be selected for the new call in this example, as its weighted load balancing score is 6 versus a load balancing score of 5 for route R1.

According to still another embodiment of the invention, raw numbers can be used for the individual scores instead of giving a 1 or a 0 for a criterion when comparing two routes. For example, in the individual score for BW criterion may be 1.142, i.e. the ratio between the average bandwidth of the two routes (20 M/17.5 M).

Re-routing of existent calls may also be performed in a similar manner. In this case however, the score for the path that carries the call to be re-routed is calculated without that call.

We claim:

1. A method of routing calls across a communication network with per-call load balancing, the method comprising: identifying at least two possible alternate routes for a new call;

determining a first route performance value for each said possible route, for a call attribute corresponding to a bandwidth criterion;

determining a second route performance value for each said possible route, for a call attribute corresponding to a priority criterion;

determining a third route performance value for each said possible route, for a call attribute corresponding to a service category criterion;

selecting a route from the at least two possible alternate routes to carry said new call based on adding together said first route performance value, said second route performance value, and said third route performance value.

2. The method of claim 1, wherein the determining of said first route performance value, said second route performance value, and said third route performance value occurs in a user-defined order.

3. The method of claim 1, wherein determining the third route performance value further comprises:

counting for each link of said at least two possible alternate routes a number of calls-in-progress that have said call attribute;

calculating an aggregated attribute by summing the number of calls-in-progress for said at least two possible alternate routes; and

determining said third route performance value by dividing said aggregated attribute to the number of hops along said respective possible route.

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4. The method of claim 1, wherein determining the first route performance value further comprises:

calculating an aggregated bandwidth by summing bandwidth consumed by all calls-in-progress along each link of said at least two possible alternate routes; and

determining said first route performance value by dividing said aggregated bandwidth to a number of hops along said at least two possible alternate routes.

5. The method of claim 1, wherein determining the first route performance value further comprises:

calculating for each link of said at least two possible alternate routes a consumed link bandwidth by summing bandwidth consumed by all calls-in-progress along said link;

calculating a link bandwidth value by dividing said consumed link bandwidth by link bandwidth capacity; and determining said first route performance value by summing said link bandwidth values for all links of said at least two possible alternate routes.

6. The method of claim 1, further comprising: re-routing a call-in-progress established along a current route across said network between a source and a destination to the selected route.

7. The method of claim 6, wherein the re-routing of the call-in-progress is determined without considering any route performance values for said current route.

8. The method of claim 1, further comprising: assigning a weight to each route performance value based on user-specified preferences for each route performance value.

9. The method of claim 8, further comprising: assigning different weights to at least two of the route performance values.

10. A system that performs load balancing of calls in a communication network, the system comprising:

a routing module that selects a list of possible alternate routes between a user-specified source and a destination;

a load balancing criteria module that receives a configuration form from a user that specifies selection criteria used for load balancing;

a link attribute processing unit that receives the selection criteria from the load balancing criteria module and the list of possible alternate routes from the routing module;

a first aggregated attribute calculation unit that determines a first route performance value for the list of possible alternate routes for a call attribute corresponding to a bandwidth criterion;

a second aggregated attribute calculation unit that determines a second route performance value for the list of possible alternate routes for a call attribute corresponding to a priority criterion;

a third aggregated attribute calculation unit that determines a third route performance value for the list of possible alternate routes for a call attribute corresponding to a service category criterion; and

a route selector that selects a route for a new call from said list of possible alternate routes, based on adding together said first route performance value, said second route performance value, and said third route performance value.

11. The system of claim 10, wherein each of the aggregated attribute calculation units assigns a weight to each route performance value based on user-specified preferences for each route performance value.

12. The system of claim 11, wherein different weights are assigned to at least two of the route performance values.

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13. A system that performs load balancing of calls between a source and a destination within a communication network, the system comprising:  
a routing module that selects a list of possible alternate routes between said source and said destination;  
a load balancing criteria module that receives a configuration form from a user that specifies selection criteria used for load balancing;  
a link attribute processing unit that receives the selection criteria from the load balancing criteria module and the list of possible alternate routes from the routing module;  
a first aggregated attribute calculation unit that determines a first route performance value for the list of possible alternate routes for a call attribute corresponding to a bandwidth criterion;  
a second aggregated attribute calculation unit that determines a second route performance value for the list of possible alternate routes for a call attribute corresponding to a priority criterion;

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a third aggregated attribute calculation unit that determines a third route performance value for the list of possible alternate routes for a call attribute corresponding to a service category criterion;  
a scoring unit that provides a route score, based on adding together said first route performance value, said second route performance value, and said third route performance value for each route in the list of possible alternate routes; and  
a route selector that selects a route for a new call to be routed between said source and said destination, based on said route score.  
14. The system of claim 13, wherein each of the aggregated attribute calculation units assigns a weight to each route performance value based on user-specified preferences for each route performance value.  
15. The system of claim 14, wherein different weights are assigned to at least two of the route performance values.

\* \* \* \* \*



UNITED STATES PATENT AND TRADEMARK OFFICE  
**CERTIFICATE OF CORRECTION**

PATENT NO. : 7,885,398 B2  
APPLICATION NO. : 11/367401  
DATED : February 8, 2011  
INVENTOR(S) : Neeraj Chandra and Gerardo Martin Espinosa

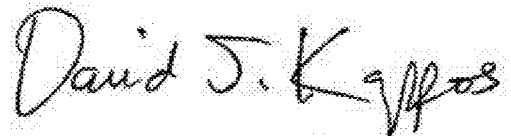
Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Claims:

Claim 13, column 11, line 3, please change "s stem" to --system--.

Signed and Sealed this  
Twenty-ninth Day of March, 2011

A handwritten signature in black ink that reads "David J. Kappos". The signature is written in a cursive, flowing style.

David J. Kappos  
*Director of the United States Patent and Trademark Office*

# **EXHIBIT D**

## **Prosecution History of the '398 Patent**

030606

17712 U.S. PTO

PTO/SB/05 (05-05)O

Approved for use through 07/31/2006. OMB 0651-0032  
U.S. Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

**UTILITY  
PATENT APPLICATION  
TRANSMITTAL**

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	ALC 3226
First Inventor	Neeraj Chandra
Title	MULTIPLE CRITERIA BASED LOAD BALANCING
Express Mail Label No.	

**APPLICATION ELEMENTS**

See MPEP chapter 600 concerning utility patent application contents.

1. ☒ **Fee Transmittal Form** (e.g., PTO/SB/17)  
(Submit an original and a duplicate for fee processing)
2. ☐ **Applicant claims small entity status.**  
See 37 CFR 1.27.
3. ☒ **Specification** [Total Pages 120]  
Both the claims and abstract must start on a new page  
(For information on the preferred arrangement, see MPEP 608.01(a))
4. ☒ **Drawing(s)** (35 U.S.C. 113) [Total Sheets 3]
5. **Oath or Declaration** [Total Sheets 2]  
  - a. ☒ Newly executed (original or copy)
  - b. ☐ A copy from a prior application (37 CFR 1.63(d))  
(for continuation/divisional with Box 18 completed)
    - i. ☐ **DELETION OF INVENTOR(S)**  
Signed statement attached deleting inventor(s)  
name in the prior application, see 37 CFR  
1.63(d)(2) and 1.33(b).
6. ☒ **Application Data Sheet.** See 37 CFR 1.76
7. ☐ **CD-ROM or CD-R** in duplicate, large table or  
Computer Program (Appendix)  
☐ Landscape Table on CD
8. **Nucleotide and/or Amino Acid Sequence Submission**  
(if applicable, items a. - c. are required)
  - a. Computer Readable Form (CRF)
    - i. ☐ Computer Readable Form (CRF)
    - ii. ☐ Transfer Request (37 CFR 1.821(e))
  - b. Specification Sequence Listing on:
    - i. ☐ CD-ROM or CD-R (2 copies); or
    - ii. ☐ Paper
  - c. ☐ Statements verifying identity of above copies

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**ACCOMPANYING APPLICATION PARTS**

9. ☒ **Assignment Papers** (cover sheet & document(s))  
Name of Assignee Alcatel
10. ☐ **37 CFR 3.73(b) Statement** (when there is an assignee) ☒ **Power of Attorney**
11. ☐ **English Translation Document** (if applicable)
12. ☒ **Information Disclosure Statement** (PTO/SB/08 or PTO-1449)  
☐ Copies of foreign patent documents, publications, & other information
13. ☐ **Preliminary Amendment**
14. ☒ **Return Receipt Postcard** (MPEP 503)  
(Should be specifically itemized)
15. ☐ **Certified Copy of Priority Document(s)**  
(if foreign priority is claimed)
16. ☐ **Nonpublication Request** under 35 U.S.C. 122(b)(2)(B)(i).  
Applicant must attach form PTO/SB/35 or equivalent.
17. ☐ **Other:** \_\_\_\_\_

18. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in the first sentence of the specification following the title, or in an Application Data Sheet under 37 CFR 1.76:

☐ Continuation    ☐ Divisional    ☐ Continuation-in-part (CIP)    of prior application No.: \_\_\_\_\_

Prior application information: Examiner \_\_\_\_\_ Art Unit: \_\_\_\_\_

**19. CORRESPONDENCE ADDRESS**
☒ The address associated with Customer Number: 30868    OR    ☐ Correspondence address below

Name

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State

Zip Code

Country

Telephone

Email Address

Signature

Date

Name  
(Print/Type)

Todd E. Marlette

Registration No.  
(Attorney/Agent)

35,269

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030606

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**FEE TRANSMITTAL**  
**For FY 2006**☐ Applicant claims small entity status. See 37 CFR 1.27**TOTAL AMOUNT OF PAYMENT** (\$) 1,240.00**Complete if Known**

Application Number	Unassigned
Filing Date	March 6, 2006
First Named Inventor	Neeraj Chandra
Examiner Name	Unassigned
Art Unit	Unassigned
Attorney Docket No.	ALC 3226

**METHOD OF PAYMENT (check all that apply)**☐ Check ☒ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): \_\_\_\_\_☒ Deposit Account Deposit Account Number: 50-0578 Deposit Account Name: Kramer & Amado, P.C.

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☐ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, except for the filing fee☒ Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17 ☒ Credit any overpayments**WARNING:** Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.**FEE CALCULATION (All the fees below are due upon filing or may be subject to a surcharge.)****1. BASIC FILING, SEARCH, AND EXAMINATION FEES**

Application Type	FILING FEES		SEARCH FEES		EXAMINATION FEES		Fees Paid (\$)
	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	
Utility	300	150	500	250	200	100	\$ 1,000.00
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

**2. EXCESS CLAIM FEES**

Fee Description	Fee (\$)	Small Entity Fee (\$)
Each claim over 20 (including Reissues)	50	25
Each independent claim over 3 (including Reissues)	200	100
Multiple dependent claims	360	180

Total Claims	Extra Claims	Fee (\$)	Fee Paid (\$)
16	- 20 or HP =	x	=

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims	Extra Claims	Fee (\$)	Fee Paid (\$)
4	- 3 or HP =	1 x 200 =	\$ 200.00

HP = highest number of independent claims paid for, if greater than 3.

**3. APPLICATION SIZE FEE**

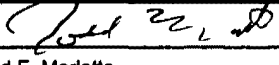
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Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee (\$)	Fee Paid (\$)
17	- 100 =	/ 50 =	(round up to a whole number) x	=

**4. OTHER FEE(S)**

Non-English Specification, \$130 fee (no small entity discount)

Other (e.g., late filing surcharge): Assignment Recordation \$40.00**SUBMITTED BY**

Signature		Registration No. (Attorney/Agent) 35,269	Telephone 703-519-9801
Name (Print/Type)	Todd E. Marlette		Date 7/6/06

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UTILITY  
PATENT APPLICATION  
TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	ALC 3226
First Inventor	Neeraj Chandra
Title	MULTIPLE CRITERIA BASED LOAD BALANCING
Express Mail Label No.	

## APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. ☒ **Fee Transmittal Form** (e.g., PTO/SB/17)  
(Submit an original and a duplicate for fee processing)
2. ☐ **Applicant claims small entity status.**  
See 37 CFR 1.27.
3. ☒ **Specification** [Total Pages 120]  
Both the claims and abstract must start on a new page  
(For information on the preferred arrangement, see MPEP 608.01(a))
4. ☒ **Drawing(s)** (35 U.S.C. 113) [Total Sheets 3]
5. **Oath or Declaration** [Total Sheets 2]  
  - a. ☒ Newly executed (original or copy)
  - b. ☐ A copy from a prior application (37 CFR 1.63(d))  
(for continuation/divisional with Box 18 completed)
    - i. ☐ **DELETION OF INVENTOR(S)**  
Signed statement attached deleting inventor(s)  
name in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).
6. ☒ **Application Data Sheet.** See 37 CFR 1.76
7. ☐ **CD-ROM or CD-R** in duplicate, large table or  
Computer Program (Appendix)  
☐ Landscape Table on CD
8. **Nucleotide and/or Amino Acid Sequence Submission**  
(if applicable, items a. - c. are required)
  - a. Computer Readable Form (CRF)
    - i. ☐ Computer Readable Form (CRF)
    - ii. ☐ Transfer Request (37 CFR 1.821(e))
  - b. Specification Sequence Listing on:
    - i. ☐ CD-ROM or CD-R (2 copies); or
    - ii. ☐ Paper
  - c. ☐ Statements verifying identity of above copies

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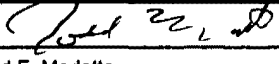
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## **MULTIPLE CRITERIA BASED LOAD BALANCING**

### **Related US Patent Applications**

**[001]** Co-pending US Patent application SN: N/A, entitled "Prioritized connection load balancing, Chandra et al., filed on even date, and assigned to Alcatel, Applicant's Docket 150112.

### **Field of the invention**

**[002]** The invention is directed to a method and apparatus for load balancing the calls within a switched network based on a user-specified set of criteria, and in particular to PVC (permanent virtual connections) switched digital networks.

### **Background of the Invention**

**[003]** PVC switched digital communications networks such as e.g. ATM (Asynchronous Transfer Mode) networks are widely used for high-speed broadband data transport. In this type of networks, once a call is established, it will use generally the same route for the life, unless a physical link of the route becomes unavailable, in which case the call is rerouted. Various routing criteria are used for centrally provisioning communication sessions between users of such networks. Some of the currently used criteria are cost of the route, number of hops along a route and bandwidth load of the respective route.

**[004]** Since a communication network has at its disposal limited resources (link bandwidth and node processing capacity) to ensure efficient data transmission, efficient use of the resources is an important requirement. When traffic demand increases, a network may become congested, resulting in degraded network performance. On the other hand, for proper operation, a network must be implemented so as to avoid congestion. The simplest solution obviously is to increase the capacity of the network; however this solution is generally undesirable for evident reasons of costs. Other less obvious solutions in support of efficient network operation consist in applying preventive measures, of which



the main one is load balancing. Load balancing attempts to fairly distributing the traffic over all the links of the network to avoid a local congestion in particular resources and to better utilize the resources across the network.

**[005]** Currently, the most common criteria for load balancing are based on determining an aggregated BW (aggregated over multiple hops) for each possible route for a call, and selecting the route with the lowest aggregated utilization for a new call. This is for example described in the US Patent 6,697,333 (Bawa et al.) entitled "Bandwidth load consideration in network route selection", issued on February 24, 2004 to Alcatel. The patent describes load balancing methods applicable to both new calls and existing connected calls, using bandwidth load as a selection criterion in addition to route cost and number of link hops in a route. Particularly, the method described in the patent selects the path (route) for a call from alternative paths having equal least cost, and then equal least number of link hops, a path having the less average bandwidth represented as an aggregate of bandwidth usage for each link hop.

**[006]** The problem with this approach is that the users do not have any involvement in the routing of their calls. But, in order to successfully manage the traffic across a PVC switched digital network it is important not only to allocate sufficient bandwidth for each connection from the knowledge of the source characteristics and the network status, but also to take into account user-specified criteria. Such criteria may be the a user specified calls priority, that indicates the relative importance of calls in the network and ultimately the order in which calls can be eventually released or submitted to a degradation of their quality of service. Another criterion could for example be the service category of the calls, or combinations of the above criteria, applied in a specified order, or subsets of the above criteria, etc.

**[007]** Thus, there remains a need to provide a route selection method that takes into consideration user-specified criteria.



### **Summary of the Invention**

**[008]** It is an object of the invention to provide a method of routing calls in a PVC switched digital network that alleviates totally or in part the problems associated with the current method of routing calls.

**[009]** It is another object of the invention to provide a method of routing calls in a PVC switched digital network that performs load balancing of calls based on various user-specified criteria.

**[0010]** A further object of this invention is to provide a method of routing calls in a PVC switched digital network that takes into account user-specified call priorities for both new and existing calls, in order to perform a multiple criteria based load balancing.

**[0011]** Accordingly, the invention provides a method of routing calls across a communication network with per-call load balancing, comprising: a) identifying at least two possible alternate routes for a new call; b) determining a route performance value for each the possible route, for a call attribute corresponding to a user-defined load balancing criterion; and c) selecting a route for carrying the new call based on the route performance value.

**[0012]** The invention also provides a method of re-routing a call-in-progress established along a current route across the network between a source and a destination across a communication network, comprising: identifying at least an additional possible route for the call-in-progress between the source and destination; determining a route performance value for the current route and the additional possible route, based on a call attribute corresponding to a user-defined load balancing criterion; comparing the route performance values for the current route and the additional possible route, to determine a best route; and re-routing the call-in-progress along the best route.

**[0013]** According to a further aspect, the invention is directed to a system for load balancing calls between within a communication network using a user-

defined load balancing criterion, comprising: a routing module for selecting a plurality of possible alternate routes between user-specified source and destination; a load balancing criteria module for establishing a call attribute based on the criterion defined over an user interface; a link attribute processing unit for determining a link performance value for each link of each possible route based on the call attribute; an aggregated attribute calculation unit for determining a route performance value for each possible route, based on the link performance values; and a route selector for selecting a route for a new call from the possible alternate routes, based on the route performance value.

**[0014]** Still further, the invention provides a system for load balancing calls between a source and a destination within a communication network, based on a set of user-defined criteria. The system includes a routing module for selecting all possible alternate routes between the source and the destination; a load balancing criteria module for establishing a set of call attributes based on the set of user-defined criteria received over an user interface; a link attribute processing unit for determining a link performance value for each link of each possible route and for each call attribute of the set; a plurality of aggregated attribute calculation units, each aggregated attribute calculation unit for determining a route performance value for a given call attribute of the set for all possible routes, based on the link performance values for the respective call attribute and the respective possible route; a scoring unit for each possible routes, each scoring unit for providing a route score, based on the route performance for each call attribute of the set; and a route selector for selecting a route for a new call to be routed between the source and destination, based on the route score.

**[0015]** Advantageously, with the method of the invention, the calls are distributed across the network according to both the specific network configuration and user-specified criteria. This approach results in prioritizing the calls as desired by the users, a better failure response, lower costs to the users. Reducing the effects of service outages on high priority connections is a valuable feature from both the customers' and service provider's point of view. Higher

cost routes may for example be assigned to carry high speed traffic of lower priority, since such routes may not be fully protected, while high priority calls may be routed on shorter paths, with high redundancy, as specified by the respective user. Or, the service provider and the users may decide to route the calls based on load balancing cable utilization aggregated over multiple hops, before or after applying to route selection the user specified criteria.

**[0016]** Another benefit of this approach is that the operator has more control over how calls are distributed across the network, to best fit customer's needs with the network capabilities.

#### **Brief Description of the drawings**

**[0017]** The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of the preferred embodiments, as illustrated in the appended drawings, where:

**Figure 1** shows the block diagram of the load balancing system according to the invention;

**Figure 2** shows a four nodes network for providing examples of load balancing method of the invention, for various criteria and sub-sets of criteria; and

**Figure 3** shows the block diagram of the load balancing system according to another embodiment of the invention.

#### **Detailed Description**

**[0018]** The invention described herein is best suitable for load balancing in PVC switched digital networks (such as an ATM network) and is preferably implemented in the networks equipped with a network management system (NMS). A PCV is a connection defined at subscription time and provisioned by the NMS. The invention might also be implemented at a switch level for soft permanent virtual connections (SPVC). A SPVC is a signaled PVC, which is set up on demand via a signaling protocol, and automatically re-established after a system restart.

**[0019]** The method and system described here use an aggregated load balancing approach based on various sets of criteria. Call routing or/and re-routing may be performed on a per-call basis as well as at the network level (applied to all calls in that network).

**[0020]** Figure 1 shows the block diagram of the load balancing system according to the invention. The term “route” is used to define a physical path between a source and a destination, specifying all intermediate nodes (hops) of the respective communication network. The term “link” is used to define the portion of the route between two consecutive nodes along the route. The term “call” is used here for a path (facility) across the switched network between a source and a destination established by a set of cross-connections expanding one or more network elements. A call can be routed along a plurality of physical routes/paths, referred here as “possible routes”.

**[0021]** A call is also defined by one or more attributes. An example of a user-specified call attribute (or a user-specified attribute) is the call priority, or a call service category, call bandwidth, etc. Attributes of a call may also be specified by the operator, derived from his/her knowledge of on-going events, etc. It is to be noted that the attributes specified above are only by way of example and that the invention is not limited to the above listed attributes. The attributes are denoted in the following with Attr1, Attr2, ...AttrZ; all call attributes irrespective if they are user (client or operator) specified or resulting from network constraints are referred here collectively as “call attributes” or “attributes”.

**[0022]** According to the invention, a user may specify a number of attributes to be used for load balancing; in which case these attributes are referred to as “criteria”.

**[0023]** As seen in Figure 1, the load balancing system **10** includes a load balancing criteria module **12**, a link attribute processing unit **14**, a plurality of aggregated attribute calculation units **15** and a route selector that are used for applying the load balancing criteria for route selection. Figure 1 also shows a

user interface **11** for enabling a user to specify the call requirements, such as call source and destination, bandwidth, preferred routing restrictions, etc., to a routing module **3** present at the node, for enabling the routing module **3** to prepare a list of possible paths that satisfy these requirements

**[0024]** According to the invention, the user can also specify through a configuration form **8** which criteria system **10** should use for load balancing, and the order in which to look at these criteria. Unit **12** processes the data from the configuration form **8** and configures system **10** accordingly. Namely, unit **12** provides link attributes processing unit **14** with the criteria to be used, and the order of their applicability.

**[0025]** According to the invention, the routing module **3** selects the possible routes for the respective call based on network configuration information and the current network map stored in a database **5**. The possible routes are denoted with R1 to Rn in Figure 1. Database **5** may store for example data derived from the current network SW configuration, HW configuration, such as the number of the nodes along each selected possible route, the processing power (e.g. switching capacity/maximum allowed bandwidth, number of connections allowed) of the nodes, the type of the links (fiber, cable, wire, wireless, the current state, and the length, etc., which all are taken into consideration when the possible routes are calculated. The number of nodes (hops) is used for calculating average values, as seen later. The cost of a link is defined by a user and it is used for calculating the route cost. Other data may be stored in database **5**, which may be used as selection criteria for the path.

**[0026]** Routing module **3** may be enhanced with the capability of first selecting from the possible routes provided by the routing module only the routes that have the lower cost, or the lower number of hops, etc. These design options may simplify the load balancing process on the expense of a less precise balancing.

**[0027]** The link attributes processing unit **14** receives the list with the possible routes for the call of interest from routing module **3**, the selection criteria from

load balancing criteria module **12**, and also receives from database **5** the link attributes specified by the selection criteria. Link attributes processing unit **14** then determines a link performance value, denoted with Link Perf1 to link PerfZ on Figure 1, for each link of a respective route and for the respective attribute Attr1 to AttrZ, and provides this link performance value to a respective aggregated attribute calculation unit **15-1** to **15-Z**. For example, in case when bandwidth balancing is performed, link attributes processing unit **14** determines the bandwidth consumed by all calls-in-progress along each link of routes R1 to Rn and provides this link performance values to aggregated attributes calculation unit **15-1**, along with the number of links on the respective routes. If load balancing based on call priority is performed, the link performance value provided by the link attributes processing unit **14** is the number of calls of that given priority (the priority of the new call) for each link of each of the routes R1 to Rn.

**[0028]** Each aggregated attribute calculation unit **15-1** **15-i**, to **15-Z** is responsible with calculating an aggregated value of a respective attribute Attr1 to AttrZ for each possible route R1 to Rn; the aggregated attributes are denoted with  $A_iR_j$ , where  $i$  is the index of the aggregated attribute calculation unit (e.g. unit **15-i**), and  $j$  is the index for a respective possible route. An aggregated attribute calculation unit performs a specific operation on the calls on each link of a respective route, which depends on the nature of attribute. For example, in case of bandwidth balancing, the total BW of a route is obtained by summing the link bandwidth received from unit **14**. Or, the call priority aggregated attribute is obtained by adding the link calls received from unit **14** for the respective route. It is to be noted that the total number of aggregated attribute calculation unit may be less than the number of all possible attributes intended to be used by the system for load balancing. This is because some of the calculation units can be re-used for calculating aggregated attributes of similar nature. For example, the aggregated attribute calculation unit used for call priority can also be used for call service category.

**[0029]** Aggregated attribute calculation units **15** preferably average the aggregated attribute over the number of hops of that route. Averaging is however not necessary if the possible routes have the same number of links. To generalize, each unit **15-1** **15-i**, to **15-Z** estimates the performance of the possible routes with respect to the respective attribute, referred here as route performance value; the method of assessing the route performance depends on the attribute.

**[0030]** A route selector **18** selects the route for a new call based on the route performance with respect to a certain criteria, by comparing the route performances of all possible routes and selecting the route with the best performance value; the definition of the best performance also depends on the attribute. For example, for the bandwidth attribute, the route with the minimum bandwidth consumed obtains the best performance value; for the call priority attribute, the route with the minimum average number of calls of that priority gets the best performance value, etc.

**[0031]** Figure 1 shows only connections for selection of a route based on the first attribute Attr1 for simplicity; it is to be understood that the other aggregated attribute calculation units interact in a similar way with unit **18**.

**[0032]** Route selector **18** then passes the selected route to routing module **3** which then enables routing of the call on the selected route. The system shown in Figure 1 enables load balancing based on a user-specified criterion, such as call service category, priority or bandwidth, etc.

**[0033]** It is to be noted that the load balancing criteria may be applied in sequence, such as first the route with the lowest cost is selected, then, if the route selector returns more than one selected routes with the same cost, the call priority criteria is next applied to these selected routes, and so on. In order to enable the system to repeat the selection for the next attribute, the identity of the selected routes for the respective attribute is provided to the link attribute processing unit **14**, so as to enable unit **14** to repeat the process for the next



criterion. For example, if the first load balancing criteria is priority and the second is service category, if two routes have the same priority, as determined by route selector **18** from the results received from aggregated attribute calculation unit **15-1**, the identity of these routes is returned to unit **14**, as seen at **17**, to enable link attributes processing unit **14** to instruct a respective aggregated attribute calculation unit (e.g. unit **15-2**) to determine the performance of these selected routes with respect to call service category.

**[0034]** Figure 2 illustrates a few examples of the operation of the system **10** of Figure 1 on a network **20** with four nodes A, B C and D. In this example, the nodes are connected as shown by links A-B, A-C, C-D and B-D; all links have in this example a maximum capacity of 100Mbs. Also, for the sake of simplicity, we assume there could be only three service category levels, where Q1 is the highest, Q2 is the medium and Q3 the lowest. Similarly, we assume that there are five user specified priorities available, where P1 is the highest priority and P5 is the lowest. The links have calls traversing them with the attributes specified in the Table 1 below:

Table 1

	Link A-B	Link B-D	Link A-C	Link C-D
<b>No. of calls (N)</b>	5	10	8	8
<b>BW Consumed</b>	10M	25M	10M	20M
<b>Priority (P)</b>	3xP5, 1xP2, 1xP1	4xP5, 5xP2, 1xP1	3xP5, 3xP2, 2xP1	3xP5, 3xP2, 2xP1
<b>Service category (Q)</b>	1xQ1, 2xQ2, 2xQ3	3xQ1, 5xQ2, 2xQ3	1xQ1, 5xQ2, 2xQ3	1xQ1, 5xQ2, 2xQ3

**[0035]** A plurality of route selection scenarios are next described using network **20** of Figure 2 and the link attributes from Table 1. In the following examples, route selection is performed for a new call that originates at node A for node D, using one or more load balancing criteria. There are two possible routes between nodes A and D, namely a first route, route R1, denoted with **22** along links A-B and B-D, and a second route, route R2, denoted with **24**, along links A-



C and C-D. For these examples the new call has a bandwidth of 5M, a service category of Q1 and a priority of P1.

Scenario 1: Service category as the only load balancing criterion

**[0036]** In the following scenario, the route for the new call is determined using as the load balancing criteria only the service category. Since the new call has service category Q1, which is the highest service category, we take into account all calls-in-progress with Q1, from all calls along the respective links of the possible routes R1 and R2. Using Table 1 and knowing that the number of hops on each route is 2, the average service category along these routes are:

**[0037]** For route R1:  $1 \times Q1 \text{ (link A-B)} + 3 \times Q1 \text{ (link B-D)} = 4$ , which means that an aggregate of four calls have a service category of Q1. The service category average is determined by dividing the aggregate number of calls with a service category of Q1 to the number of hops along the route. This results in a service category average of  $4 : 2 \text{ hops} = 2$ .

**[0038]** For route R2:  $1 \times Q1 \text{ (link A-C)} + 1 \times Q1 \text{ (link C-D)} = 2$ , which means that an aggregate of two calls have a service category of Q1. The service category average is determined again by dividing the aggregate number of calls with service category = Q1 to the number of hops. This results in a service category average of  $2 : 2 \text{ hops} = 1$ . Route R2 is therefore selected for the new call as it offers a path with a smaller average number of service category calls belonging to the same category (Q1).

Scenario 2: User-specified priority as the only load balancing criterion

**[0039]** Let's now attempt to connect the same call as in above Scenario 1, using only the call priority as the criterion. In this case, since the new call has a user-specified priority P1, which is the highest priority, we take into account the calls with P1 from all calls along the respective links of the possible routes R1 and R2. Using Table 1 above, and knowing that the number of hops on each route is 2, the route search results will be as follows.

**[0040]** For route R1:  $1 \times P1$  (link A-B) +  $1 \times P1$  (link B-D) = 2, which means that an aggregate of two calls have a priority of P1. The priority average is calculated by dividing the aggregate number of calls with priority P1 to the number of hops along that route. This results in a priority average of 2: 2 hops = 1.

**[0041]** For route R2:  $2 \times P1$  (link A-C) +  $2 \times P1$  (link C-D) = 4, which means that an aggregate of four calls have a priority of P1. The priority average is again determined by dividing the aggregate number of P1 calls to the number of hops along route R2. This results in a priority average of 4: 2 hops = 2. Route R1 is therefore selected for the new call as it offers a path with a smaller average number of P1 calls.

### Scenario 3: Bandwidth as the only load balancing criterion

**[0042]** Since in this scenario the load balancing criterion is the bandwidth, the bandwidth average for the routes R1 and R2 should be determined, and the path with the minimum bandwidth utilization is selected. Using Table 1 above, and knowing that the number of hops on each route is 2, the route search results will be as follows.

**[0043]** For route R1:  $10M$  (link A-B) +  $25M$  (link B-D) =  $35M$ , which means that route R1 has an aggregate bandwidth of  $35M$ . The bandwidth average is determined by dividing the aggregate bandwidth to the number of hops along that route. This results in an average bandwidth of  $35: 2 \text{ hops} = 17.5M$  for route R1.

**[0044]** For route R2:  $10M$  (link A-C) +  $20M$  (link C-D) =  $30$ , the average bandwidth is again determined by dividing the aggregate bandwidth to the number of hops along route R2. This results in an average bandwidth of  $30: 2 \text{ hops} = 15M$ . Route R2 is therefore selected for the new call as it offers a path with less average bandwidth consumed. It is to be noted that load balancing based on bandwidth may also be calculated by dividing the bandwidth utilized on a link by the link capacity (which is  $100M$  in our example) and aggregating these link bandwidth values for all links of the route. In the above example, this gives the same result:

For Route R1:  $10/100 + 25/100 = .35$

For Route R2:  $10/100 + 20/100 = 0.3$

**[0045]** It is to be noted that the above scenarios show simple examples for convenience; in addition, all describe use of only one criterion has to achieve load balancing. Nonetheless, the benefit of this approach is obvious, in that the calls are distributed across the network as desired according to the respective load balancing criterion.

**[0046]** Some operators might desire a higher level of control in terms of load balancing by specifying more than one criteria (e.g. number of calls, priority, service category, bandwidth, etc.) to achieve distribution of calls across their network. For example it might be desirable to pick a route that offers a higher number of calls of a given priority, if the bandwidth and service category averages are lower across that route. In this situation, a score may be calculated for each route, and the route with a better score is selected for the respective call.

**[0047]** Figure 3 illustrates the block diagram of the load balancing system **30** according to another embodiment of the invention, where the system uses a set of criteria for load balancing. In this case, the user specifies a set of criteria to be used for load balancing; the user may specify the criteria set through e.g. a configuration form **8**. As discussed in connection with the embodiment of Figure 1, an aggregated attribute calculation units **15-1** to **15-Z** provides a route performance value (e.g. A1R1 or AzRn) for each route R1 to Rn with respect to each attribute A1 to Az.

**[0048]** The load balancing system **30** is also provided with scoring units **16-1** to **16-n** connected at the output of the aggregated attribute calculation units **15-1** to **15-n**; there are n scoring units operating for n possible routes is n. Each scoring unit **16** calculates a score for a route for the criteria in the user-specified set, taking the respective route performances into consideration. As such, the

number of scoring units operating at a certain moment varies with the number of possible routes available for that call.

**[0049]** A scoring unit **16-1** to **16-n** compounds the route performances for all possible routes for a given attribute and provides an individual score denoted with sR1 to sRn. In the example in Figure 3 the set of route performance values used by scoring unit **16-1** are established using call attributes A1 to Az; evidently more or less criteria may be used for scoring route performance. Also, Figure 3 shows the scoring for route R1 only for simplicity.

**[0050]** It is also to be noted that system **30** also allows the operator/user to specify which attributes to use during path selection and also to determine their order. According to the invention, not only that a plurality of user-selected criteria or criteria subsets may be specified for load balancing, but also the order of applying the criteria may be changed. For example, load balancing using bandwidth may be considered first, possibly followed by hops and then cost. As an optional add-on the user can specify the ability to override a criterion (e.g. bandwidth) based on one or more criteria (e.g. service category, and bandwidth).

**[0051]** According to still another embodiment of the invention, the user can assign (again through a configuration form) weights to each criterion; these are denoted with w1 to wz in Figure 3. The weights could have decimal values or can be integers. The weights are used for enabling more flexibility in load balancing, according to user or operator specified preferences.

#### Scenario 4: Load balancing using a set of criteria

**[0052]** An example for selecting a route using weighted load balancing criteria is given again for the network of Figure 2, with the link attributes of Table 1. In the following, we will denote the load balancing scores for each criterion using capital letters N for the number of calls, BW for bandwidth, P for priority, and Q for service category; the corresponding lowercase letters are used for the weights attributed to the respective criterion. By way of example also, we use a score of 1 (1 point) for a route if that particular criterion is better along that route;

otherwise the respective route gets 0 points. In this case, route R1 receives an individual score of 0 for the bandwidth criterion, since its average bandwidth is 17.5M, while the average bandwidth of route R2 is only 15M (see above Scenario 3). For the priority criterion, route R1 receives an individual score of 1, as it offers a path with a lower average number of P1 calls (see Scenario 2). Finally, for the service category criterion route R receives an individual score of 0, since route R2 offers a path with a lower average number of service category calls belonging to the same category Q1 (see Scenario 1).

**[0053]** Let's also assume that the weights used are whole number weights previously specified for load balancing, and that  $p=5$ ,  $bw=3$  and  $q=3$ .

**[0054]** The route score for route R1 is obtained by adding the individual scores weighted as indicated above:

$$\text{ScoreR1} = b \times BW = p \times P + q \times Q = 0 \times 3 + 1 \times 5 + 0 \times 3 = 5$$

**[0055]** Similarly, the route score for route R2 is obtained by adding the weighted individual scores.

$$\text{ScoreR2} = b \times BW = p \times P + q \times Q = 1 \times 3 + 0 \times 5 + 1 \times 3 = 6$$

**[0056]** Route R2 will be selected for the new call in this example, as its weighted load balancing score is 6 versus a load balancing score of 5 for route R1.

**[0057]** According to still another embodiment of the invention, raw numbers can be used for the individual scores instead of giving a 1 or a 0 for a criterion when comparing two routes. For example, in the individual score for BW criterion may be 1.142, i.e. the ratio between the average bandwidth of the two routes (20M/17.5M).

**[0058]** Re-routing of existent calls may also be performed in a similar manner. In this case however, the score for the path that carries the call to be re-routed is calculated without that call.

**[0058] WE CLAIM:**

1. A method of routing calls across a communication network with per-call load balancing, comprising:

- a) identifying at least two possible alternate routes for a new call;
- b) determining a route performance value for each said possible route, for a call attribute corresponding to a user-defined load balancing criterion; and
- c) selecting a route for carrying said new call based on said route performance value.

2. The method of claim 1, further comprising repeating steps a) to c) for an additional attribute corresponding to an additional user-defined criterion, whenever a plurality of possible routes have the same route performance value.

3. The method of claim 2, wherein the order of determining said route performance value for said user defined criterion and said further user-defined criterion is user-defined.

4. The method of claim 1, wherein said call attribute is one of a user-defined call priority and a service category.

5. The method of claim 4, wherein step b) comprises, for each said possible route:

- counting for each link of said respective possible route the number of calls-in-progress that have said call attribute;
- calculating an aggregated attribute by summing the number of calls-in-progress counted in step b1) for said respective possible route; and
- determining said route performance value by dividing said aggregated attribute to the number of hops along said respective possible route.

6. The method of claim 1, wherein said user-defined attribute is call bandwidth.

7. The method of claim 6, wherein step b) comprises, for each said possible route: calculating an aggregated bandwidth by summing the bandwidth consumed by all calls-in-progress along each link of said respective possible route; and determining said route performance value by dividing said aggregated bandwidth to the number of hops along said respective possible route.

8. The method of claim 6, wherein step b) comprises:  
calculating for each link of said respective possible route a consumed link bandwidth by summing the bandwidth consumed by all calls-in-progress along said link;  
calculating a link bandwidth value by dividing said consumed link bandwidth to link bandwidth capacity; and  
determining said route performance value by summing said link bandwidth values for all links of said respective possible route.

9. The method of claim 1, further comprising d) re-routing a call-in-progress established along a current route across said network between a source and a destination based on said call attribute.

10. The method of claim 9, wherein step d) comprises:  
identifying at least an additional possible route for said call-in-progress between said source and destination;  
determining a route performance value for said current route and each said additional possible route, based on said call attribute corresponding to said user-defined criterion;  
comparing the route performance values for said current route and each said additional possible route, to determine a best route; and  
re-routing said call-in-progress along said best route.

11. The method of claim 10, wherein said route performance value for said current route is determined without considering said call attribute for said current route.

12. A method of re-routing a call-in-progress established along a current route across said network between a source and a destination across a communication network, comprising:

identifying at least an additional possible route for said call-in-progress between said source and destination;

determining a route performance value for said current route and said additional possible route, based on a call attribute corresponding to a user-defined load balancing criterion;

comparing the route performance values for said current route and said additional possible route, to determine a best route; and

re-routing said call-in-progress along said best route.

13. A system for load balancing calls between within a communication network using a user-defined load balancing criterion, comprising:

a routing module for selecting a plurality of possible alternate routes between user-specified source and destination;

a load balancing criteria module for establishing a call attribute based on said criterion defined over an user interface;

a link attribute processing unit for determining a link performance value for each link of each said possible route based on said call attribute;

an aggregated attribute calculation unit for determining a route performance value for each said possible route, based on said link performance values; and

a route selector for selecting a route for a new call from said possible alternate routes, based on said route performance value.



14. A system for load balancing calls between a source and a destination within a communication network, based on a set of user-defined criteria, comprising:

- a routing module for selecting all possible alternate routes between said source and said destination;

- a load balancing criteria module for establishing a set of call attributes based on said set of user-defined criteria received over an user interface;

- a link attribute processing unit for determining a link performance value for each link of each said possible route and for each call attribute of said set;

- a plurality of aggregated attribute calculation units, each aggregated attribute calculation unit for determining a route performance value for a given call attribute of said set for all said possible routes, based on said link performance values for said respective call attribute and said respective possible route;

- a scoring unit for each said possible routes, each scoring unit for providing a route score, based on said route performance for each said call attribute of said set; and

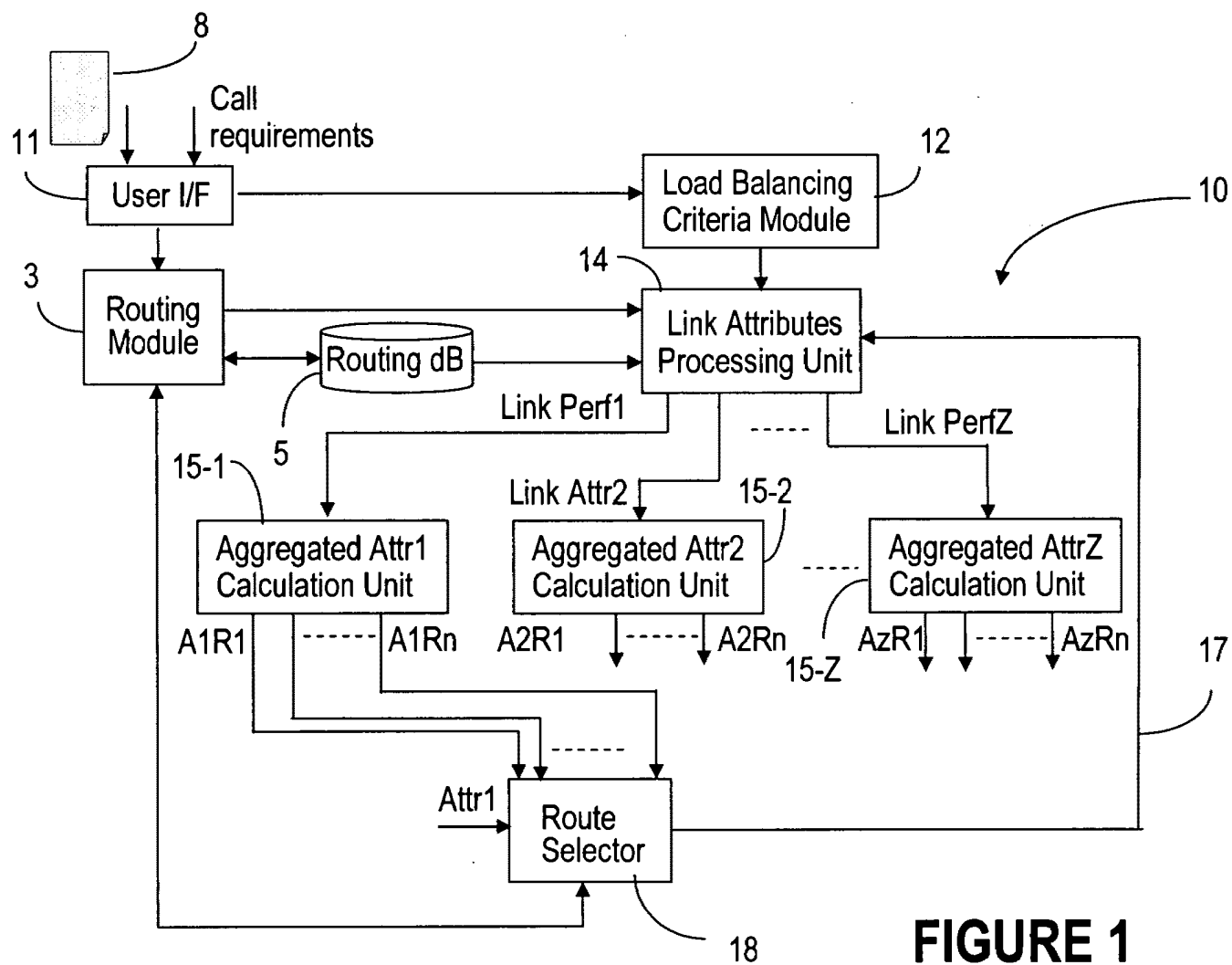
- a route selector for selecting a route for a new call to be routed between said source and destination, based on said route score.

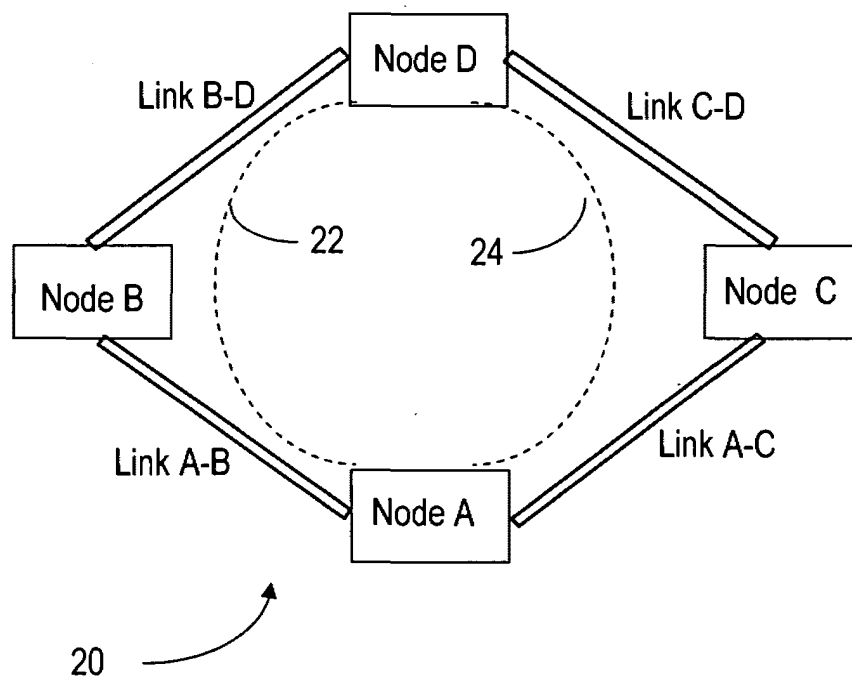
15. The system of claim 14, wherein said set of attributes includes one or more of a user-defined call priority, a service category, call bandwidth, a route cost, and the number of hops along a route.

16. The system of claim 14, wherein said aggregated attribute calculation units provide a weighted route performance value, for biasing the load balancing process based on user-specified preferences.

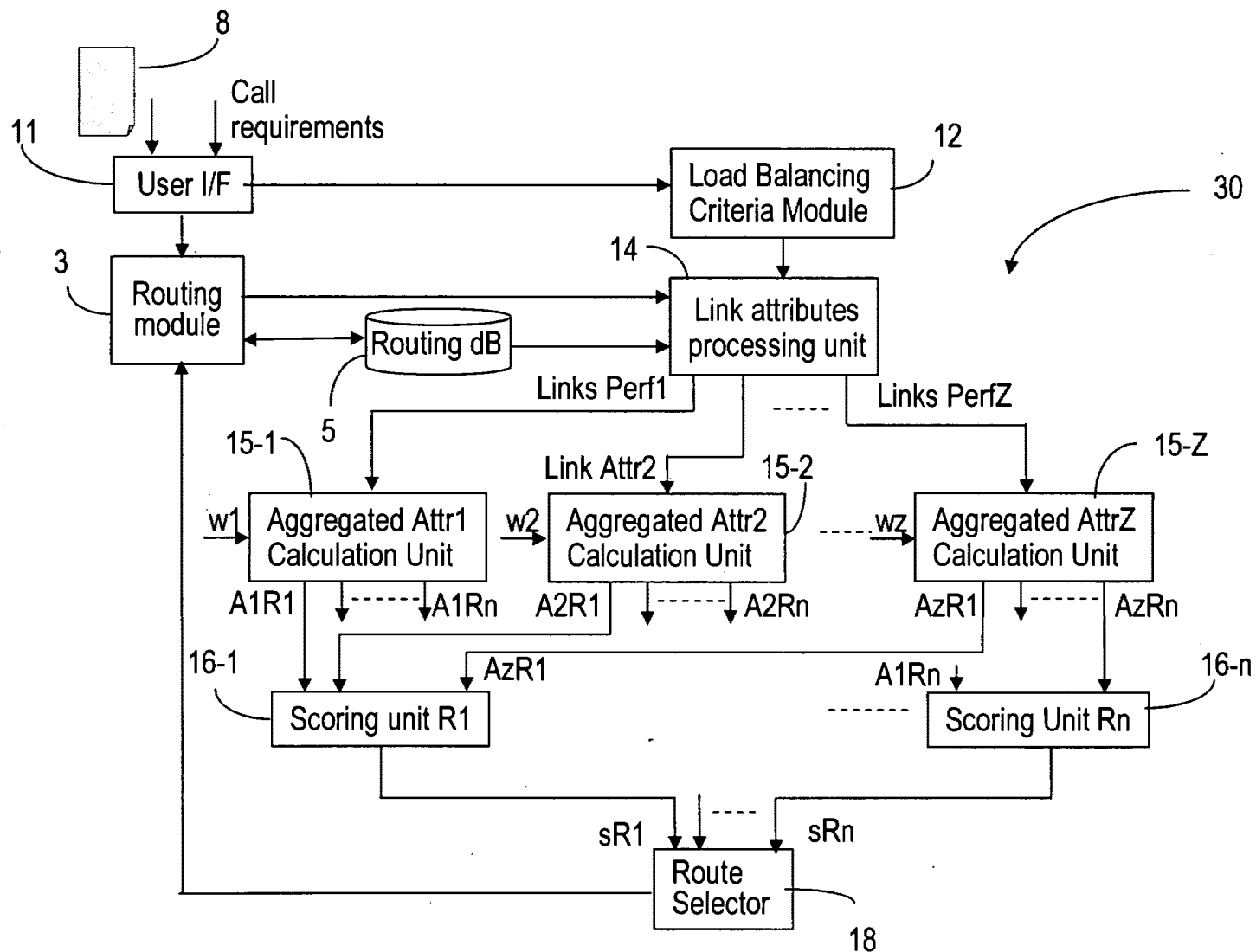
## **ABSTRACT**

This invention provides the ability to load balance calls in a communications network using a certain criterion, such as a user-specified call priority, or the call service category. The method is applied when selecting a route for a new call or for re-balancing the calls across a network. When the user-specified call priority is used, the aggregated number of calls with the same priority or service category is calculated for all possible routes the new call may use. The aggregated number of calls is then divided by the number of hops in the respective routes; the route with the smallest ratio is selected for the new call. Re-balancing is performed by re-routing the calls in such a way as to obtain a similar number of calls of the same priority, or service category along all possible routes.

**FIGURE 1**



**FIGURE 2**

**FIGURE 3**

<b>DECLARATION AND POWER OF ATTORNEY FOR UTILITY OR DESIGN PATENT APPLICATION</b> (37 CFR 1.63) <input checked="" type="checkbox"/> Declaration Submitted with Initial Filing. <input type="checkbox"/> Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16(e)) required).	Attorney Docket No.: 150136-US First Named Inventor: Neeraj Chandra <b>COMPLETE IF KNOWN</b> Application Number: Filing Date: Group Art Unit: Examiner Name:
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As a below named inventor, I hereby declare that:

My residence, mailing address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

#### MULTIPLE CRITERIA BASED LOAD BALANCING

the specification of which

- ☒ is attached hereto.  
☐ was filed on \_\_\_\_\_ as United States Application Serial No. \_\_\_\_\_ or PCT International Application No. \_\_\_\_\_  
 and was amended on \_\_\_\_\_ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

#### Foreign Application(s) and/or Claim of Foreign Priority

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or any PCT international application having a filing date before that of the application on which priority is claimed.

Country	Application Number	Date Filed	Priority Claimed Under 35 U.S.C. §119
			<input type="checkbox"/> Yes <input type="checkbox"/> No
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#### Provisional Application

I hereby claim the benefit under 35 U.S.C. 119(e) of any United States provisional application(s) listed below:

Application Serial Number	Filing Date

#### U.S. Priority Claim

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

Application Serial Number	Filing Date	Status - Patented/Pending/Abandoned

**POWER OF ATTORNEY**

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re. Application of: Neeraj Chandra et al

Serial No.:

Filed:

Title: **MULTIPLE CRITERIA BASED LOAD BALANCING**

Atty. Docket No.: 150136-US

The Commissioner of Patents and Trademarks

Washington, D.C. 20231

U.S.A.

**ASSOCIATE POWER OF ATTORNEY**

Dear Sir:

The undersigned, John Granchelli (Reg. No. 39,512), is an agent of record for the captioned U.S. Patent Application under a Power of Attorney filed with the U.S. Patent Office contemporaneously herewith.

Pursuant to 37 CFR Section 1.34(b), the undersigned hereby appoints the following registered practitioners as associate agents of record:

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to prosecute said application and to transact all business in the U.S. Patent and Trademark Office connected therewith. The appointment of the above practitioners does not affect, and is not intended to affect, the status of any other practitioner who has been appointed previously as agent of record for this matter.



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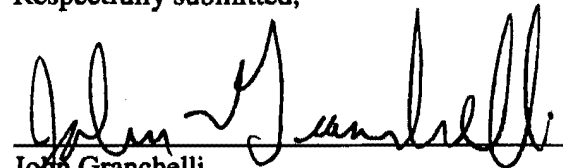
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FEE RECORD SHEET

03/07/2006 STEUMEL1 00000082 11367401

01 FC:1011	300.00 OP
02 FC:1111	500.00 OP
03 FC:1311	200.00 OP
04 FC:1201	200.00 OP

PTO-1556

(5/87)

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**PATENT APPLICATION FEE DETERMINATION RECORD**

Substitute for Form PTO-875 Effective December 8, 2004

Application or Docket Number

1136740.1

**APPLICATION AS FILED - PART I**

(Column 1)

(Column 2)

**SMALL ENTITY**

OR

**OTHER THAN  
SMALL ENTITY**

FOR	NUMBER FILED	NUMBER EXTRA
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A
EXAMINATION FEE (37 CFR 1.16(d), (p), or (q))	N/A	N/A
TOTAL CLAIMS (37 CFR 1.16(i))	16 minus 20 =	0
INDEPENDENT CLAIMS (37 CFR 1.16(h))	4 minus 3 =	1
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).	
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))		

RATE (\$)	FEE (\$)
N/A	150.00
N/A	\$250
N/A	\$100
X\$ 25 =	
X100 =	
+180=	
TOTAL	

RATE (\$)	FEE (\$)
N/A	300.00
N/A	\$500
N/A	\$200
X\$50 =	0
X200 =	200
+360=	
TOTAL	1200

\* If the difference in column 1 is less than zero, enter "0" in column 2.

**APPLICATION AS AMENDED - PART II**

(Column 1)

(Column 2)

(Column 3)

**SMALL ENTITY**

OR

**OTHER THAN  
SMALL ENTITY**

AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total (37 CFR 1.16(j))	Minus	**	=
Independent (37 CFR 1.16(h))	Minus	***	=
Application Size Fee (37 CFR 1.16(s))			
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))			

RATE (\$)	ADDITIONAL FEE (\$)
X\$ 25 =	
X100 =	
+180=	
TOTAL ADD'L FEE	

RATE (\$)	ADDITIONAL FEE (\$)
X\$50 =	
X200 =	
+360=	
TOTAL ADD'L FEE	

1, 12, 13, 14

(Column 1)

(Column 2)

(Column 3)

AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total (37 CFR 1.16(j))	Minus	**	=
Independent (37 CFR 1.16(h))	Minus	***	=
Application Size Fee (37 CFR 1.16(s))			
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))			

RATE (\$)	ADDITIONAL FEE (\$)
X\$ 25 =	
X100 =	
+180=	
TOTAL ADD'L FEE	

RATE (\$)	ADDITIONAL FEE (\$)
X\$50 =	
X200 =	
+360=	
TOTAL ADD'L FEE	

\* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

\*\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Application Number.: Unassigned  
Attorney Docket No.: ALC 3226

## **APPLICATION DATA SHEET**

### **Application Information**

Application Type::	Regular
Subject Matter::	Utility
CD-ROM or CD-R?::	None
Title::	MULTIPLE CRITERIA BASED LOAD BALANCING
Attorney Docket Number::	ALC 3226
Request for Early Publication?::	no
Suggested Drawing Figure::	1
Total Drawing Sheets::	3
Small Entity?::	no
Petition Included?::	no
Secrecy Order in Parent Appl.?::	no

### **Applicant Information**

Applicant Authority Type::	Inventor
Primary Citizenship Country::	Canada
Status::	Full Capacity
Given Name::	Neeraj
Middle Name::	
Family Name::	Chandra
City of Residence::	Ottawa
State or Province of Residence::	ON
Country of Residence::	Canada
Street Mailing Address::	1310 Pinecrest Road, Apt. 1011
City of Mailing Address::	Ottawa
State or Province of Mailing Address::	ON
Country of Mailing Address::	Canada

Application Number.: Unassigned  
Attorney Docket No.: ALC 3226

Postal or Zip Code of Mailing Address:: K2C 3N8  
Applicant Authority Type:: Inventor  
Primary Citizenship Country:: Canada  
Status:: Full Capacity  
Given Name:: Gerardo  
Middle Name:: Martin  
Family Name:: Espinosa  
City of Residence:: Plano  
State or Province of Residence:: TX  
Country of Residence:: USA  
Street Mailing Address:: 3804 Stockport Drive  
City of Mailing Address:: Plano  
State or Province of Mailing Address:: TX  
Country of Mailing Address:: USA  
Postal or Zip Code of Mailing Address:: 75025

**Correspondence Information**

Correspondence Customer Number:: 30868

**Representative Information**

Representative Customer Number::	30868
----------------------------------	-------

**Assignee Information**

Assignee Name:: Alcatel  
Street of Mailing Address:: 54 rue la Boétie  
City of Mailing Address:: Paris  
Country of Mailing Address:: France  
Postal or Zip Code of Mailing Address:: 75008

**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of:	:	Neeraj Chandra, et al.
	:	
For:	:	MULTIPLE CRITERIA BASED LOAD BALANCING
	:	
Serial No.	:	Unassigned
	:	
Filed	:	March 6, 2006
	:	
Art Unit	:	Unassigned
	:	
Examiner	:	Unassigned
	:	
Attorney Docket No.	:	ALC 3226
	:	
Confirmation No.	:	Unassigned

**INFORMATION DISCLOSURE STATEMENT**

Mail Stop Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

Dear Sir:

This Information Disclosure Statement is submitted:

- X   under 37 CFR 1.97(b), or  
(Within three months of filing national application; or date of entry of international application; or before mailing date of first office action on the merits; whichever occurs last)
- under 37 CFR 1.97(c) together with either a:  
           Certification under 37 CFR 1.97(e), or  
           a \$180.00 fee under 37 CFR 1.17(p), or  
(After the CFR 1.97(b) time period, but before final action or notice of allowance, whichever occurs first)

Application No.: Unassigned  
Attorney Docket No.: ALC 3226

- under 37 CFR 1.97(d) together with a:
- Certification under 37 CFR 1.97(e), and
  - a petition under 37 CFR 1.97(d)(2)(ii), and
  - a \$180.00 petition fee set forth in 37 CFR 1.17(i)(1).
- (Filed after final action or notice of allowance, whichever occurs first, but before payment of the issue fee)

X Applicant(s) submit herewith Form PTO/SB/08A Information Disclosure Statement by Applicant together with copies, of patents, publications or other information of which applicant(s) are aware, which applicant(s) believe(s) may be material to the examination of this application and for which there may be a duty to disclose in accordance with 37 CFR 1.56.

The relevance of the attached references is that this is the closest art of which Applicant(s) is(are) aware.

Applicant(s) submit that the above references taken alone or in combination neither anticipate nor render obvious the present invention. Consideration of the foregoing in relation to this application is respectfully requested.

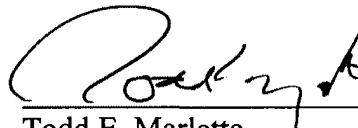
It is requested that the information disclosed herein be made of record in this application.

In the event that the fees submitted prove to be insufficient in connection with the filing of this paper, please charge our deposit account number 50-0578 and please credit any excess fees to such Deposit Account.

Respectfully submitted,  
KRAMER & AMADO, P.C.

Date: \_\_\_\_\_

3/6/00



Todd E. Marlette  
Reg. No. 35,269

KRAMER & AMADO, P.C.  
1725 Duke Street, Suite 240  
Alexandria, VA 22314  
Telephone No.: (703) 519-9801  
Facsimile No: (703) 519-9802

Approved for use through 07/31/2006. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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Substitute for form 1449/PTO

# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

**(Use as many sheets as necessary)**

Sheet	1	of	1
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**Complete if Known**

Application Number	Unassigned
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Filing Date	March 6, 2006
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First Named Inventor	Neeraj Chandra
----------------------	----------------

Art Unit	Unassigned
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Examiner Name	Unassigned
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Attorney Docket Number	ALC 3226
------------------------	----------

## U. S. PATENT DOCUMENTS

[illegible]

## FOREIGN PATENT DOCUMENTS

[illegible]

**Examiner  
Signature**

Date	
Considered	

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. <sup>1</sup>Applicant's unique citation designation number (optional). <sup>2</sup>See Kinds Codes of USPTO Patent Documents at [www.uspto.gov](http://www.uspto.gov) or MPEP 901.04. <sup>3</sup>Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>4</sup>For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>5</sup>Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>6</sup>Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.





## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NUMBER	FILING OR 371(c) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/367,401	03/06/2006	Neeraj Chandra	ALC 3226

**CONFIRMATION NO. 7790**

30868  
KRAMER & AMADO, P.C.  
1725 DUKE STREET  
SUITE 240  
ALEXANDRIA, VA22314

**Title:** Multiple criteria based load balancing

**Publication No.** US-2007-0206762-A1

**Publication Date:** 09/06/2007

**NOTICE OF PUBLICATION OF APPLICATION**

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publicly available Searchable Databases via the Internet at [www.uspto.gov](http://www.uspto.gov). The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at [www.uspto.gov](http://www.uspto.gov) using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently <http://pair.uspto.gov/>. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

**PATENT**

**IN THE UNITED STATE PATENT AND TRADEMARK OFFICE**

In re application of:	:	CHANDRA, N. et al.
	:	
For:	:	MULTIPLE CRITERIA BASED LOAD BALACING
	:	
Serial No.	:	11/367,401
	:	
Filed	:	March 6, 2006
	:	
Art Unit	:	2614
	:	
Examiner	:	MATAR, AHMAD
	:	
Attorney Docket No.	:	ALC 3226
	:	
Confirmation No.	:	7790

**STATUS INQUIRY**

Mail Stop Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

Dear Sir:

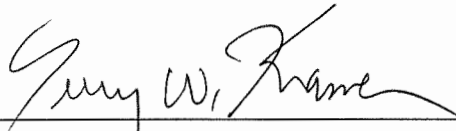
The above-identified patent application has been on file since March 6, 2006 and to date no substantive Action on the merits has been received. It is respectfully requested that an Action be issued, or an indication of when such Action may be issued.

Application No.: 11/367,401  
Attorney Docket No.: ALC 3226

No fee is believed to be due for this submission. Should any fees be required, please charge our Deposit Account No. 50-0578 and/or please credit any excess fees to such Deposit Account.

Respectfully submitted,

DATE: March 6, 2009

  
Terry W. Kramer  
Reg. No. 41,451

KRAMER & AMADO, P.C.  
1725 Duke Street, Suite 240  
Alexandria, Virginia 22314  
Tel. (703) 519-9801  
Fax. (703) 519-9802

**Electronic Acknowledgement Receipt**

<b>EFS ID:</b>	4922193
<b>Application Number:</b>	11367401
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	7790
<b>Title of Invention:</b>	Multiple criteria based load balancing
<b>First Named Inventor/Applicant Name:</b>	Neeraj Chandra
<b>Customer Number:</b>	30868
<b>Filer:</b>	Terry Wayne Kramer/Wanda Ricks
<b>Filer Authorized By:</b>	Terry Wayne Kramer
<b>Attorney Docket Number:</b>	ALC 3226
<b>Receipt Date:</b>	06-MAR-2009
<b>Filing Date:</b>	06-MAR-2006
<b>Time Stamp:</b>	17:16:08
<b>Application Type:</b>	Utility under 35 USC 111(a)

**Payment information:**

Submitted with Payment	no
------------------------	----

**File Listing:**

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for status of Application	ALC3226STATUS.pdf	38858 e1efa93c3e27de0d489a4b57be643b306ff53e46	no	2

**Warnings:****Information:**

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

**New Applications Under 35 U.S.C. 111**

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office  
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Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

KRAMER & AMADO, P.C.  
1725 DUKE STREET  
SUITE 240  
ALEXANDRIA, VA 22314

DATE: 04/14/2009

To: Applicant of Serial Number 11367401  
Filed on 06-MAR-2006  
(Art Unit 2614)

It is estimated that this application will receive an Office action in approximately 10 months. This is an estimate that is based on the current inventory level of applications filed in this art area and the current staffing levels in this Art Unit. The USPTO is dedicated to minimizing first action and total pendency, and we are targeting resources to help address backlogs in art areas with high new application filings. Thank you for your inquiry.

Customer Service Office in Technology Center: 2600

Phone Number: 571-272-2600  
Central Fax Number: 571-273-8300

Applicant/Attorney Contact Information:

Phone Number: 613-591-3600  
Fax Number:

Print Form

PTO/SB/81 (07-08)

Approved for use through 12/31/2008. OMB 0651-0035

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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**POWER OF ATTORNEY  
OR  
REVOCATION OF POWER OF ATTORNEY  
WITH A NEW POWER OF ATTORNEY  
AND  
CHANGE OF CORRESPONDENCE ADDRESS**

Application Number	11/367,401
Filing Date	March 6, 2006
First Named Inventor	CHANDRA, N.
Title	MULTIPLE CRITERIA BASED LOAD BALANCING
Art Unit	2614
Examiner Name	Ahmad Matar
Attorney Docket Number	ALC 3226

I hereby revoke all previous powers of attorney given in the above-identified application.

☐ A Power of Attorney is submitted herewith.

OR

☒ I hereby appoint Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s) to prosecute the application identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

76614

OR

☐ I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s) to prosecute the application identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

Practitioner(s) Name	Registration Number

Please recognize or change the correspondence address for the above-identified application to:

☒ The address associated with the above-mentioned Customer Number.

OR

☐ The address associated with Customer Number:

OR

☐ Firm or Individual Name

Address

City

State

Zip

Country

Telephone

Email

I am the:

☐ Applicant/Inventor.

OR

☒ Assignee of record of the entire interest. See 37 CFR 3.71.

Statement under 37 CFR 3.73(b) (Form PTO/SB/96) submitted herewith or filed on \_\_\_\_\_

SIGNATURE of Applicant or Assignee of Record

Signature

Date

Name

Gregory J. Murgala

Telephone

+1 (908) 582-7109

Title and Company

Corporate Counsel, Alcatel Lucent USA Inc.

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

☒ Total of 2 forms are submitted.

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/SB/96 (01-08)

Approved for use through 06/30/2008. OMB 0651-0031  
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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**STATEMENT UNDER 37 CFR 3.73(b)**Applicant/Patent Owner: ALCATELApplication No./Patent No.: 11/367,401 Filed/Issue Date: March 6, 2006Entitled: MULTIPLE CRITERIA BASED LOAD BALANCINGALCATEL, a Corporation  
(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

1. ☒ the assignee of the entire right, title, and interest; or
2. ☐ an assignee of less than the entire right, title and interest  
(The extent (by percentage) of its ownership interest is \_\_\_\_\_ %)

in the patent application/patent identified above by virtue of either:

A ☒ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 017615, Frame 0239, or for which a copy thereof is attached.

OR

B ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: \_\_\_\_\_ To: \_\_\_\_\_  
The document was recorded in the United States Patent and Trademark Office at Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.
2. From: \_\_\_\_\_ To: \_\_\_\_\_  
The document was recorded in the United States Patent and Trademark Office at Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.
3. From: \_\_\_\_\_ To: \_\_\_\_\_  
The document was recorded in the United States Patent and Trademark Office at Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet.

☐ As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

  
Signature

8/3/09  
Date

Assistant VP, Patent Creation  
Alcatel-Lucent USA Inc.  
Printed or Typed Name

908 582-7109  
Telephone Number

Corporate Counsel, Authorized Representative of Alcatel  
Title

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



**Electronic Acknowledgement Receipt**

<b>EFS ID:</b>	5841155
<b>Application Number:</b>	11367401
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	7790
<b>Title of Invention:</b>	Multiple criteria based load balancing
<b>First Named Inventor/Applicant Name:</b>	Neeraj Chandra
<b>Customer Number:</b>	30868
<b>Filer:</b>	Terry Wayne Kramer/Angelica Rodriguez
<b>Filer Authorized By:</b>	Terry Wayne Kramer
<b>Attorney Docket Number:</b>	ALC 3226
<b>Receipt Date:</b>	06-AUG-2009
<b>Filing Date:</b>	06-MAR-2006
<b>Time Stamp:</b>	14:28:25
<b>Application Type:</b>	Utility under 35 USC 111(a)

**Payment information:**

Submitted with Payment	no
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**File Listing:**

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	ALC3226_RevPOA.pdf	111279 e9ab47ada054f482d31b06cba99b89ba679c3417	no	2

**Warnings:****Information:**

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

**New Applications Under 35 U.S.C. 111**

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/367,401	03/06/2006	Neeraj Chandra	ALC 3226

30868  
 KRAMER & AMADO, P.C.  
 1725 DUKE STREET  
 SUITE 240  
 ALEXANDRIA, VA 22314

**CONFIRMATION NO. 7790**  
**POWER OF ATTORNEY NOTICE**



\*OC000000037309221\*

Date Mailed: 08/14/2009

### NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 08/06/2009.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

/gbien-aime/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/367,401	03/06/2006	Neeraj Chandra	ALC 3226

**CONFIRMATION NO. 7790****POA ACCEPTANCE LETTER**

\*OC000000037309269\*

76614  
Kramer & Amado, P.C.  
1725 Duke Street  
Suite 240  
Alexandria, VA 22314

Date Mailed: 08/14/2009

**NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY**

This is in response to the Power of Attorney filed 08/06/2009.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/gbien-aime/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



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APPLICATION NUMBER	PATENT NUMBER	GROUP ART UNIT	FILE WRAPPER LOCATION
11/367,401		2614	



**Correspondence Address/Fee Address Change**

The following fields have been set to Customer Number 76614 on 08/18/2009

- Correspondence Address
- Power of Attorney Address

The address of record for Customer Number 76614 is:

76614  
Kramer & Amado, P.C.  
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Alexandria, VA 22314



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/367,401	03/06/2006	Neeraj Chandra	ALC 3226	7790
76614	7590	09/02/2009		
Kramer & Amado, P.C. 1725 Duke Street Suite 240 Alexandria, VA 22314			EXAMINER SHARIFZADA, IBRAHAM K	
			ART UNIT 2614	PAPER NUMBER
			MAIL DATE 09/02/2009	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary****Application No.**

11/367,401

**Applicant(s)**

CHANDRA ET AL.

**Examiner**

IBRAHAM SHARIFZADA

**Art Unit**

2614

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --****Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06 March 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 March 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>03/06/2006</u> .  | 6) <input type="checkbox"/> Other: _____                          |

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## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 3, 6, 10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Claim 3 recites the limitation "said further user-defined criterion" in lines 2-3 of claim 3. There is insufficient antecedent basis for this limitation in the claim.

4. Claim 6 recites the limitation "said user-defined attribute" in line 1 of claim 6. There is insufficient antecedent basis for this limitation in the claim.

5. Claim 10 recites the limitation "said user-defined criterion" in line 5-6 of claim 10. There is insufficient antecedent basis for this limitation in the claim.

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. **Claims 1, 4 are rejected under 35 U.S.C. 102(b) as being anticipated by Hedden [US 2002/0071542].**



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Re claim 1, Hedden discloses a method of routing calls across a communication network (col. 5 lines 42-59) with per-call load balancing, comprising: a) identifying at least two possible alternate routes for a new call (col. 4 lines 1-36); b) determining a route performance value for each said possible route, for a call attribute corresponding to a user-defined load balancing criterion (col. 4 lines 1-36); and c) selecting a route for carrying said new call based on said route performance value (col. 4 lines 1-36).

Re claim 4, Hedden discloses wherein said call attribute is one of a user-defined call priority and a service category (col. 4 lines 1-36).

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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**5. Claims 2-3, 5-7, 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hedden [US 2002/0071542] in view of Bawa et al. [US 6697333].**

Re claim 2, Hedden discloses repeating steps a) to c) for an additional attribute corresponding to an additional user-defined criterion (col. 4 lines 1-36).

Hedden fails to disclose repeating these steps whenever a plurality of possible routes have the same route performance value.

However, Bawa discloses repeating steps a) to c) for an additional attribute corresponding to an additional criterion whenever a plurality of possible routes have the same route performance value (col. 3 lines 7-26).

Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Hedden with the ability to determine additional attributes whenever the previous attributes come up with the same route performance value as taught by Bawa for the purposes of enabling a better route selection algorithm to determine the best possible route.

Re claim 3, Hedden discloses wherein the order of determining said route performance value for said user defined criterion and said further user-defined criterion is user-defined (col. 4 lines 1-36).

Re claim 5, Hedden fails to fully disclose wherein step b) comprises, for each said possible route: counting for each link of said respective possible route the number of calls-in-progress that have said call attribute; calculating an aggregated attribute by summing the number

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of calls-in-progress counted in step b1) for said respective possible route; and determining said route performance value by dividing said aggregated attribute to the number of hops along said respective possible route.

However, Bawa discloses wherein step b) comprises, for each said possible route: counting for each link of said respective possible route the number of calls-in-progress that have said call attribute (col. 3 lines 28-65); calculating an aggregated attribute by summing the number of calls-in-progress counted in step b1) for said respective possible route (col. 3 lines 28-65); and determining said route performance value by dividing said aggregated attribute to the number of hops along said respective possible route (col. 3 lines 28-65).

Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Hedden with a route calculation algorithm as taught by Bawa for the purposes of determining the status of the network links and routes so as to better decide which route to choose from.

Re claim 6, Hedden discloses wherein said user-defined attribute is route integrity (col. 4 lines 1-36).

Hedden does not disclose that the attribute is specifically call bandwidth.

However, Bawa discloses that the attribute is call bandwidth (col. 3 lines 59-62).

Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Hedden with determining route performance based on call bandwidth as taught by Bawa for the purposes of determining the status of the network links and routes so as to better decide which route to choose from.

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Re claim 7, Hedden fails to fully disclose wherein step b) comprises, for each said possible route: calculating an aggregated bandwidth by summing the bandwidth consumed by all calls-in-progress along each link of said respective possible route; and determining said route performance value by dividing said aggregated bandwidth to the number of hops along said respective possible route.

However, Bawa discloses wherein step b) comprises, for each said possible route: calculating an aggregated bandwidth by summing the bandwidth consumed by all calls-in-progress along each link of said respective possible route (col. 3 lines 28-65); and determining said route performance value by dividing said aggregated bandwidth to the number of hops along said respective possible route (col. 3 lines 28-65).

Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Hedden with a route calculation algorithm as taught by Bawa for the purposes of determining the status of the network links and routes so as to better decide which route to choose from.

Re claim 9, Hedden fails to disclose re-routing a call-in-progress established along a current route across said network between a source and a destination based on said call attribute.

However, Bawa discloses re-routing a call-in-progress established along a current route across said network between a source and a destination based on said call attribute (col. 4 lines 1-19).

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Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Hedden with the ability to re-route in-progress calls as taught by Bawa for the purposes of ensuring that a call is maintained even if the route it is being transmitted through degrades in quality or becomes over congested.

Re claim 10, Hedden fails to disclose identifying at least an additional possible route for said call-in-progress (col. 3 lines 66-67) between said source and destination (col. 4 lines 1-19); determining a route performance value for said current route and each said additional possible route, based on said call attribute corresponding to said user-defined criterion (col. 4 lines 1-19); comparing the route performance values for said current route and each said additional possible route, to determine a best route (col. 4 lines 51-55); and re-routing said call-in-progress along said best route (col. 4 lines 51-55).

However, Bawa discloses identifying at least an additional possible route for said call-in-progress between said source and destination; determining a route performance value for said current route and each said additional possible route, based on said call attribute corresponding to said user-defined criterion; comparing the route performance values for said current route and each said additional possible route, to determine a best route; and re-routing said call-in-progress along said best route.

Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Hedden with the ability to re-route in-progress calls as taught by Bawa for the purposes of ensuring that a call is maintained even if the route it is being transmitted through degrades in quality or becomes over congested.

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Re claim 11, Hedden fails to disclose wherein said route performance value for said current route is determined without considering said call attribute for said current route.

However, Bawa discloses wherein said route performance value for said current route is determined without considering said call attribute for said current route (col. 2 lines 49-54).

Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Hedden with the ability to determine route performance value without the call attribute as taught by Bawa for the purposes of enabling the user to automatically select the best route available regardless of whether the current route is performing at high enough level.

**6. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hedden [US 2002/0071542] in view of Bawa et al. [US 6697333] as applied to claim 6 above, and further in view of Imai [US 7443800].**

Re claim 8, Hedden in view of Bawa fail to fully disclose wherein step b) comprises: calculating for each link of said respective possible route a consumed link bandwidth by summing the bandwidth consumed by all calls-in-progress along said link; calculating a link bandwidth value by dividing said consumed link bandwidth to link bandwidth capacity; and determining said route performance value by summing said link bandwidth values for all links of said respective possible route.

However, Imai discloses wherein step b) comprises: calculating for each link of said respective possible route a consumed link bandwidth by summing the bandwidth consumed by

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all calls-in-progress along said link (col. 3 line 56 – col. 4 line 4); calculating a link bandwidth value by dividing said consumed link bandwidth to link bandwidth capacity (col. 3 line 56 – col. 4 line 4); and determining said route performance value by summing said link bandwidth values for all links of said respective possible route (col. 4 lines 5-15).

Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Hedden in view Bawa with an algorithm that uses bandwidth capacity ratios as taught by Imai for the purposes of enabling a better route selection algorithm to determine the best possible route.

**7. Claims 12-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bawa et al. [US 6697333] in view of Hedden [US 2002/0071542].**

Re claim 12, Bawa discloses a method of re-routing a call-in-progress (col. 3 lines 66-67) established along a current route across said network between a source and a destination across a communication network, comprising: identifying at least an additional possible route for said call-in-progress between said source and destination (col. 4 lines 1-19); determining a route performance value for said current route and said additional possible route, based on a call attribute corresponding to load balancing criterion (col. 4 lines 1-19); comparing the route performance values for said current route and said additional possible route, to determine a best route (col. 4 lines 51-55); and re-routing said call-in-progress along said best route (col. 4 lines 51-55).

Bawa fails to disclose that the call attribute is based on a user-defined load balancing criterion.

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However, Hedden discloses that the call attribute is based on a user-defined load balancing criterion (col. 4 lines 1-36).

Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Bawa with a capability of allowing a user to define criteria for determining route performance as taught by Hedden so that a user can enable the system to route calls based on their own preferred preferences.

Re claim 13, Bawa discloses a system for load balancing calls between within a communication network using load balancing criterion, comprising: a routing module for selecting a plurality of possible alternate routes between user-specified source and destination (col. 3 lines 7-26); a link attribute processing unit for determining a link performance value for each link of each said possible route based on said call attribute (col. 3 lines 28-65); an aggregated attribute calculation unit for determining a route performance value for each said possible route, based on said link performance values (col. 3 lines 28-65); and a route selector for selecting a route for a new call from said possible alternate routes, based on said route performance value (col. 3 lines 28-65).

Bawa fails to disclose a load balancing criteria module for establishing a call attribute based on said criterion defined over an user interface.

However, Hedden discloses a load balancing criteria module for establishing a call attribute based on said criterion defined over a user interface (col. 4 lines 1-36).

Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Bawa with a capability of allowing a user to define criteria for



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determining route performance as taught by Hedden so that a user can enable the system to route calls based on their own preferred preferences.

Re claim 14, Bawa discloses a system for load balancing calls between a source and a destination within a communication network, based on a set of criteria, comprising: a routing module for selecting all possible alternate routes between said source and said destination (col. 3 lines 7-26); a link attribute processing unit for determining a link performance value for each link of each said possible route and for each call attribute of said set (col. 3 lines 28-65); a plurality of aggregated attribute calculation units, each aggregated attribute calculation unit for determining a route performance value for a given call attribute of said set for all said possible routes, based on said link performance values for said respective call attribute and said respective possible route (col. 3 lines 28-65); a scoring unit for each said possible routes, each scoring unit for providing a route score, based on said route performance for each said call attribute of said set (col. 3 lines 28-65); and a route selector for selecting a route for a new call to be routed between said source and destination, based on said route score (col. 3 lines 28-65).

Bawa fails to fully disclose a load balancing criteria module for establishing a set of call attributes based on said set of user-defined criteria received over an user interface.

However, Hedden discloses a load balancing criteria module for establishing a set of call attributes based on said set of user-defined criteria received over an user interface (col. 4 lines 1-36).

Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Bawa with a capability of allowing a user to define criteria for

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determining route performance as taught by Hedden so that a user can enable the system to route calls based on their own preferred preferences.

Re claim 15, Bawa discloses wherein said set of attributes includes one or more of a user-defined call priority, a service category, call bandwidth, a route cost, and the number of hops along a route (col. 3 lines 7-26).

Re claim 16, Bawa fails to fully disclose wherein said aggregated attribute calculation units provide a weighted route performance value, for biasing the load balancing process based on user-specified preferences.

However, Hedden discloses wherein said aggregated attribute calculation units provide a weighted route performance value, for biasing the load balancing process based on user-specified preferences (col. 4 lines 1-36).

Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Bawa with a capability of allowing a user to define preferences for determining route performance as taught by Hedden so that a user can enable the system to route calls based on their own preferred preferences in case they find one attribute more important than another

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***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IBRAHAM SHARIFZADA whose telephone number is (571)270-7142. The examiner can normally be reached on Monday-Friday, 7:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, FAN TSANG can be reached on (571)272-7547. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/IBRAHAM SHARIFZADA/  
Examiner, Art Unit 2614

/Olisa Anwah/  
Primary Examiner, Art Unit 2614

<b>Notice of References Cited</b>	Application/Control No. 11/367,401		Applicant(s)/Patent Under Reexamination CHANDRA ET AL.	
	Examiner IBRAHAM SHARIFZADA		Art Unit 2614	Page 1 of 1

**U.S. PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,697,333	02-2004	Bawa et al.	370/238
*	B	US-2002/0071542	06-2002	Hedden, Ralph Coleman	379/221.02
*	C	US-7,443,800	10-2008	Imai, Tetsuo	370/238
	D	US-			
	E	US-			
	F	US-			
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	I	US-			
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**FOREIGN PATENT DOCUMENTS**

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	Q					
	R					
	S					
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**NON-PATENT DOCUMENTS**

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

<b><i>Index of Claims</i></b>  	<b>Application/Control No.</b>  11367401	<b>Applicant(s)/Patent Under Reexamination</b>  CHANDRA ET AL.
	<b>Examiner</b>  IBRAHAM SHARIFZADA	<b>Art Unit</b>  2614

✓	<b>Rejected</b>	-	<b>Cancelled</b>	N	<b>Non-Elected</b>	A	<b>Appeal</b>
=	<b>Allowed</b>	÷	<b>Restricted</b>	I	<b>Interference</b>	O	<b>Objected</b>

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant		<input type="checkbox"/> CPA		<input type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47			
CLAIM		DATE							
Final	Original	08/27/2009							
	1	✓							
	2	✓							
	3	✓							
	4	✓							
	5	✓							
	6	✓							
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	15	✓							
	16	✓							



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## BIB DATA SHEET

CONFIRMATION NO. 7790

<b>SERIAL NUMBER</b> 11/367,401	<b>FILING or 371(c) DATE</b> 03/06/2006 <b>RULE</b>	<b>CLASS</b> 379	<b>GROUP ART UNIT</b> 2614	<b>ATTORNEY DOCKET NO.</b> ALC 3226	
<b>APPLICANTS</b> Neeraj Chandra, Ottawa, CANADA; Gerardo Martin Espinosa, Plano, TX; <b>** CONTINUING DATA *****</b> <b>** FOREIGN APPLICATIONS *****</b> <b>** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **</b> 03/28/2006					
Foreign Priority claimed <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No 35 USC 119(a-d) conditions met <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Verified and <u>/IBRAHAM K SHARIFZADA/</u> Acknowledged <u>Examiner's Signature</u>	<input type="checkbox"/> Met after Allowance I.S. <u>Initials</u>	<b>STATE OR COUNTRY</b> CANADA	<b>SHEETS DRAWINGS</b> 3	<b>TOTAL CLAIMS</b> 16	<b>INDEPENDENT CLAIMS</b> 4
<b>ADDRESS</b> Kramer & Amado, P.C. 1725 Duke Street Suite 240 Alexandria, VA 22314 UNITED STATES					
<b>TITLE</b> Multiple criteria based load balancing					
<b>FILING FEE RECEIVED</b> 1200	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit		

## EAST Search History

## EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	28	(379/221.01.ccls. or 370/238.ccls.) and (bandwidth with divid \$4)	US-PGPUB; USPAT	ADJ	ON	2009/08/27 10:58
S1	1	("6697333").PN.	US-PGPUB; USPAT	OR	OFF	2009/08/26 08:02
S2	27	("5233604"   "5699347"   "5940372"   "6044075"   "6084858"   "6104701"   "6141319"   "6195354"   "6256309"   "6370119").PN. OR ("6697333").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/08/26 08:49
S3	0	S2 and (user defin\$4)	US-PGPUB; USPAT	ADJ	ON	2009/08/26 09:29
S4	500	(379/219-221.07.ccls. or 370/229-240.ccls.) and (user defin\$4)	US-PGPUB; USPAT	ADJ	ON	2009/08/26 09:36
S5	63	(379/221.01.ccls. or 370/238.ccls.) and (user defin\$4)	US-PGPUB; USPAT	ADJ	ON	2009/08/26 09:37
S6	82	S4 and hop and bandwidth	US-PGPUB; USPAT	ADJ	ON	2009/08/26 09:53
S7	13	S5 and hop and bandwidth	US-PGPUB; USPAT	ADJ	ON	2009/08/26 09:53
S8	1	"20070206762"	US-PGPUB; USPAT	ADJ	ON	2009/08/26 09:55
S9	14	("20020062372"   "20030043796"   "5337352"   "5432776"   "5459837"   "5712907"   "5898668"   "5933425"   "6006264"   "6111673"   "6144641"   "6181699"   "6525851"   "6775267").PN. OR ("7027402").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/08/26 10:20


S10	14	("20020062372"   "20030043796"   "5337352"   "5432776"   "5459837"   "5712907"   "5898668"   "5933425"   "6006264"   "6111673"   "6144641"   "6181699"   "6525851"   "6775267").PN. OR ("7027402").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/08/27 08:13
S11	102	("5042027"   "5115429"   "5210740"   "5649108").PN. OR ("5933425").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/08/27 08:16
S12	2	"20020071542"	US-PGPUB; USPAT	ADJ	ON	2009/08/27 09:09

**8/ 27/ 2009 11:53:38 AM**

**C:\ Documents and Settings\ isharifzada\ My Documents\ EAST\ Workspaces\ 11367401.  
wsp**



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<b>Search Notes</b>  	<b>Application/Control No.</b>  11367401	<b>Applicant(s)/Patent Under Reexamination</b>  CHANDRA ET AL.
	<b>Examiner</b>  IBRAHAM SHARIFZADA	<b>Art Unit</b>  2614

SEARCHED			
Class	Subclass	Date	Examiner
370	238	8/27/2009	I.S.
379	221.01-221.04	8/27/2009	I.S.

SEARCH NOTES		
Search Notes	Date	Examiner
EAST Search History	8/27/2009	I.S.

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

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**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of	:	Neeraj Chandra, et al.
	:	
For	:	MULTIPLE CRITERIA BASED
	:	LOAD BALANCING
	:	
Serial No.	:	11/367,401
	:	
Filed	:	March 6, 2006
	:	
Art Unit	:	2614
	:	
Examiner	:	Ibrahim K. Sharifzada
	:	
Atty. Docket	:	ALC 3226
	:	
Confirmation No.	:	7790

**AMENDMENT UNDER 37 C.F.R § 1.111**

Mail Stop Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

In response to the Office Action dated September 2, 2009, please amend the above-identified application as set forth below:

**CLAIM AMENDMENTS** begin on page 2 of this paper.

**REMARKS/ARGUMENTS** begin on page 10 of this paper.

Application No: 11/367,401  
Attorney's Docket No: ALC 3226

### CLAIM AMENDMENTS

This listing of claims will replace all prior versions and listings of claims in the application.

1  
1 1. (Currently Amended) A method of routing calls across a communication  
2 network with per-call load balancing, the method comprising:

3 a)-identifying at least two possible alternate routes for a new call;

4 b)-determining a first route performance value for each said possible route,  
5 for a call attribute corresponding to a ~~user-defined load balancing~~ bandwidth  
6 criterion; and

7 determining a second route performance value for each said possible route,  
8 for a call attribute corresponding to a priority criterion;

9 determining a third route performance value for each said possible route, for  
10 a call attribute corresponding to a service category criterion;

11 e)-selecting a route from the at least two possible alternate routes for carrying  
12 to carry said new call based on adding together said first route performance value,  
13 said second route performance value, and said third route performance value.

1  
1 2. (Canceled).

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1 3. (Currently Amended) The method of ~~claim 2~~ claim 1, wherein the ~~order of~~  
2 determining of said first route performance value, said second route performance  
3 value, and said third route performance value for said user defined criterion and  
4 ~~said further user defined criterion is~~ occurs in a user-defined order.

1 4. (Canceled).

1 5. (Currently Amended) The method of ~~claim 4~~ claim 1, wherein ~~step b)~~  
2 ~~comprises, for each said possible route~~ determining the third route performance  
3 value further comprises:

4 counting for each link of said ~~respective possible route~~ at least two possible  
5 alternate routes ~~the a~~ number of calls-in-progress that have said call attribute;

6 calculating an aggregated attribute by summing the number of calls-in-  
7 progress ~~counted in step b1)~~ for said ~~respective possible route~~ at least two possible  
8 alternate routes; and

9 determining said third route performance value by dividing said aggregated  
10 attribute to the number of hops along said respective possible route.

1 6. (Canceled).

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1 7. (Currently Amended) The method of ~~claim 6~~ claim 1, wherein determining  
2 the first route performance value further step b) comprises, ~~for each said possible~~  
3 ~~route:~~

4 calculating an aggregated bandwidth by summing the ~~bandwidth consumed~~  
5 ~~by all calls-in-progress along each link of said respective possible route~~ at least two  
6 possible alternate routes; and

7 determining said first route performance value by dividing said aggregated  
8 bandwidth to ~~the a~~ a number of hops along said ~~respective possible route~~ at least two  
9 possible alternate routes.

1 8. (Currently Amended) The method of ~~claim 6~~ claim 1, wherein ~~step b)~~  
2 determining the first route performance value further comprises:

3 calculating for each link of said ~~respective possible route~~ at least two possible  
4 alternate routes a consumed link bandwidth by summing the ~~bandwidth consumed~~  
5 ~~by all calls-in-progress along said link;~~

6 calculating a link bandwidth value by dividing said consumed link bandwidth  
7 ~~to by~~ link bandwidth capacity; and

8 determining said first route performance value by summing said link  
9 bandwidth values for all links of said ~~respective possible route~~ at least two possible  
10 alternate routes.

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1 9. (Currently Amended) The method of claim 1, further comprising: d)  
2 re-routing a call-in-progress established along a current route across said  
3 network between a source and a destination ~~based on said call attribute~~ to the  
4 selected route.

1 10. (Canceled).

1 11. (Currently Amended) The method of ~~claim 10~~ claim 9, wherein the re-routing  
2 of the call-in-progress ~~said route performance value for said current route is~~  
3 ~~determined without considering said call attribute~~ any route performance values for  
4 said current route.

1 12. (Canceled).

1 13. (Currently Amended) A system ~~for that performs~~ load balancing of calls  
2 ~~between within in~~ a communication network ~~using a user defined load balancing~~  
3 ~~criterion, the system~~ comprising:  
4 a routing module ~~for selecting that selects~~ a plurality list of possible alternate  
5 routes between a user-specified source and a destination;

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6        a load balancing criteria module ~~for establishing a call attribute based on~~  
7 ~~said criterion defined over an user interface~~ that receives a configuration form from  
8 a user that specifies selection criteria used for load balancing;

9        a link attribute processing unit ~~for determining a link performance value for~~  
10 ~~each link of each said possible route based on said call attribute~~ that receives the  
11 selection criteria from the load balancing criteria module and the list of possible  
12 alternate routes from the routing module;

13        ~~an a first aggregated attribute calculation unit for determining that~~  
14 determines a first route performance value for the list of possible alternate routes  
15 each said possible route, based on said link performance values for a call attribute  
16 corresponding to a bandwidth criterion;

17        a second aggregated attribute calculation unit that determines a second route  
18 performance value for the list of possible alternate routes for a call attribute  
19 corresponding to a priority criterion;

20        a third aggregated attribute calculation unit that determines a third route  
21 performance value for the list of possible alternate routes for a call attribute  
22 corresponding to a service category criterion; and

23        a route selector ~~for selecting that selects~~ a route for a new call from said list  
24 of possible alternate routes, based on adding together said first route performance  
25 value, said second route performance value, and said third route performance value.



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1 14. (Currently Amended) A system ~~for that performs~~ load balancing of calls  
2 between a source and a destination within a communication network, based on a set  
3 of user-defined criteria, the system comprising:

4 a routing module ~~for selecting all that~~ selects a list of possible alternate  
5 routes between said source and said destination;

6 a load balancing criteria module ~~for establishing a set of call attributes based~~  
7 ~~on said set of user-defined criteria received over an user interface that receives a~~  
8 configuration form from a user that specifies selection criteria used for load  
9 balancing;

10 a link attribute processing unit ~~for determining a link performance value for~~  
11 ~~each link of each said possible route and for each call attribute of said set that~~  
12 receives the selection criteria from the load balancing criteria module and the list of  
13 possible alternate routes from the routing module;

14 a ~~plurality of aggregated attribute calculation units, each aggregated~~  
15 ~~attribute calculation unit for determining a route performance value for a given call~~  
16 ~~attribute of said set for all said possible routes, based on said link performance~~  
17 ~~values for said respective call attribute and said respective possible route~~

18 a first aggregated attribute calculation unit that determines a first route  
19 performance value for the list of possible alternate routes for a call attribute  
20 corresponding to a bandwidth criterion;

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Attorney's Docket No: ALC 3226

21 a second aggregated attribute calculation unit that determines a second route  
22 performance value for the list of possible alternate routes for a call attribute  
23 corresponding to a priority criterion;

24 a third aggregated attribute calculation unit that determines a third route  
25 performance value for the list of possible alternate routes for a call attribute  
26 corresponding to a service category criterion;

27 ~~a scoring unit for each said possible routes, each scoring unit for providing~~  
28 that provides a route score, based on adding together said first route performance  
29 value, said second route performance value, and said third route performance value  
30 for each route in the list of possible alternate routes~~said call attribute of said set;~~  
31 and

32 ~~a route selector for selecting that selects~~ a route for a new call to be routed  
33 between said source and said destination, based on said route score.

1  
1 15. (Canceled).

1  
1 16. (Currently Amended) The system of claim 14, wherein ~~said each of the~~  
2 ~~aggregated attribute calculation units provide~~ assigns a weighted weight to each  
3 ~~route performance value, for biasing the load balancing process based on user-~~  
4 specified preferences for each route performance value.

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Attorney's Docket No: ALC 3226

1 17. (New) The system of claim 16, wherein different weights are assigned to at  
2 least two of the route performance values.

1 18. (New) The method of claim 1, further comprising:  
2 assigning a weight to each route performance value based on user-specified  
3 preferences for each route performance value.

1 19. (New) The method of claim 18, further comprising:  
2 assigning different weights to at least two of the route performance values.

1 20. (New) The system of claim 13, wherein each of the aggregated attribute  
2 calculation units assigns a weight to each route performance value based on user-  
3 specified preferences for each route performance value.

1 21. (New) The system of claim 20, wherein different weights are assigned to at  
2 least two of the route performance values.

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**REMARKS/ARGUMENTS**

Claims 1, 3, 5, 7-9, 11, 13, 14, and 16-21 are pending in the present application. Claims 1, 12, 13, and 14 are independent. Claims 1, 3, 5, 7-9, 11, 13, 14, and 16 are amended. Claims 17-21 are new. Claims 2, 4, 6, 10, 12, and 15 are canceled without prejudice or disclaimer. No new matter has been added.

The courtesies extended to Applicant's representative by Primary Examiner Olisa Anwah and Examiner of Record Ibrahim Sharifzada during the interview held on September 17, 2009, are appreciated. The reasons presented at the interview as warranting favorable action are incorporated into the remarks below and constitute Applicant's record of the interview.

**REJECTIONS UNDER 35 U.S.C. § 112, ¶2**

On page 2, the Office Action rejects claims 3, 6, and 10 under 35 U.S.C. § 112, second paragraph as allegedly indefinite. Applicant respectfully traverses these rejections for the reasons detailed below.

Claims 6 and 10 are canceled. As agreed during the interview on September 17, 2009, claim 3 has been amended to remove the allegedly ambiguous language. Accordingly, Applicant respectfully requests withdrawal of the rejections of claims 3, 6, and 10 under 35 U.S.C. § 112, second paragraph.

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**REJECTIONS UNDER 35 U.S.C. § 102(b) AND 103(a)**

On pages 2 and 3, the Office Action rejects claims 1 and 4 under 35 U.S.C. § 102(b) as allegedly anticipated by U.S. Patent Application No. 2002/0071542 to Hedden et al. (hereinafter "Hedden"). On pages 3-8, the Office Action rejects claims 2, 3, 5-7, and 9-11 under 35 U.S.C. § 103(a) as allegedly unpatentable over Hedden in view of U.S. Patent No. 6,697,333 to Bawa et al. (hereinafter "Bawa"). On pages 8 and 9, the Office Action rejects claim 8 under 35 U.S.C. § 103(a) as allegedly unpatentable over Hedden in view of Bawa, further in view of U.S. Patent No. 7,443,800 to Imai (hereinafter "Imai"). On pages 9-12, the Office Action rejects claims 12-16 under 35 U.S.C. § 103(a) as allegedly unpatentable over Bawa in view of Hedden. Applicant respectfully traverses all of these rejections.

As amended, independent claim 1 recites, in part, the following subject matter: "selecting a route from the at least two possible alternate routes to carry said new call based on adding together said first route performance value, said second route performance value, and said third route performance value" (emphasis added). Similar subject matter appears in independent claims 13 and 14. This subject matter finds support in the published version of the specification, for example, in paragraphs [0055] - [0061]. As agreed during the interview on September 17, 2009, the references of record, alone or in combination, fail to disclose, suggest, or teach this subject matter.

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Accordingly, Applicant respectfully submits that independent claims 1, 13, and 14 are allowable over the references of record. Claims 3, 5, 7-9, 11 depend from claim 1. Claim 16 depends from claim 14. Thus, Applicant respectfully submits that claims 3, 5, 7-9, 11 and 16 are also allowable due to their respective dependencies from allowable claims. Claims 2, 4, 6, 10, 12, and 15 are canceled. Accordingly, Applicant respectfully requests withdrawal of the rejections of claims 1-16 under 35 U.S.C. § 102(b) and 103(a).

#### NEWLY ADDED CLAIMS 17-21

Newly added claim 17 recites, in part, the following subject matter: “wherein different weights are assigned to at least two of the route performance values” (emphasis added). Similar subject matter appears in newly added claims 19 and 21. This subject matter finds support in the published version of the specification, for example, in paragraph [0056].

Newly added claim 18 recites, in part, the following subject matter: “assigning a weight to each route performance value based on user-specified preferences for each route performance value” (emphasis added). Similar subject matter appears in newly added claim 20. This subject matter finds support in the published version of the specification, for example, in paragraph [0056]. This subject matter also finds support in originally filed claim 16.

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Claim 17 depends from independent claim 14. Claims 18 and 19 depend from claim 1. Claims 20 and 21 depend from claim 13. Thus, Applicant respectfully submits that claims 17-21 are allowable at least due to their respective dependencies from allowable claims.

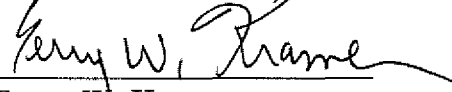
### CONCLUSION

While we believe that the instant amendment places the application in condition for allowance, should the Examiner have any further comments or suggestions, it is respectfully requested that the Examiner telephone the undersigned attorney in order to expeditiously resolve any outstanding issues.

In the event that the fees submitted prove to be insufficient in connection with the filing of this paper, please charge our Deposit Account Number 50-0578 and please credit any excess fees to such Deposit Account.

Date: September 17, 2009

Respectfully submitted,  
KRAMER & AMADO, P.C.

  
Terry W. Kramer  
Registration No.: 41,541

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Fax: 703-519-9802

**Electronic Acknowledgement Receipt**

<b>EFS ID:</b>	6095843
<b>Application Number:</b>	11367401
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	7790
<b>Title of Invention:</b>	Multiple criteria based load balancing
<b>First Named Inventor/Applicant Name:</b>	Neeraj Chandra
<b>Customer Number:</b>	76614
<b>Filer:</b>	Terry Wayne Kramer/Leilani Legaspi
<b>Filer Authorized By:</b>	Terry Wayne Kramer
<b>Attorney Docket Number:</b>	ALC 3226
<b>Receipt Date:</b>	17-SEP-2009
<b>Filing Date:</b>	06-MAR-2006
<b>Time Stamp:</b>	18:15:09
<b>Application Type:</b>	Utility under 35 USC 111(a)

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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		ALC3226Amend.pdf	313373 96a6d1c8dbe4123ebc6dc672d7b02995f5fbd727	yes	13



	Document Description	Start	End
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	9
	Applicant Arguments/Remarks Made in an Amendment	10	13

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 If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875					Application or Docket Number <b>11/367,401</b>		Filing Date <b>03/06/2006</b>		<input type="checkbox"/> To be Mailed	
<b>APPLICATION AS FILED – PART I</b>										
(Column 1)			(Column 2)			SMALL ENTITY <input type="checkbox"/> OR		OTHER THAN SMALL ENTITY		
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)			
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A				
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A			N/A				
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A				
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$ =		OR	X \$ =				
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =			X \$ =				
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).									
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))										
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL				
<b>APPLICATION AS AMENDED – PART II</b>										
(Column 1)			(Column 2)			SMALL ENTITY OR		OTHER THAN SMALL ENTITY		
AMENDMENT	09/17/2009	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
Total (37 CFR 1.16(i))	* 15	Minus	** 20	= 0	X \$ =		OR	X \$52=	0	
Independent (37 CFR 1.16(h))	* 3	Minus	***4	= 0	X \$ =		OR	X \$220=	0	
<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))										
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR			
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0	
(Column 1)			(Column 2)			SMALL ENTITY OR		OTHER THAN SMALL ENTITY		
AMENDMENT	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)		
Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =		OR	X \$ =		
Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =		OR	X \$ =		
<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))										
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR			
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE		
<p>* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.</p> <p>** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".</p> <p>*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".</p> <p>The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.</p>										

Legal Instrument Examiner:  
/LASHAWN MARKS/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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## UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/367,401	03/06/2006	Neeraj Chandra	ALC 3226	7790

76614	7590	09/25/2009
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Kramer & Amado, P.C.  
 1725 Duke Street  
 Suite 240  
 Alexandria, VA 22314

EXAMINER	
SHARIFZADA, IBRAHAM K	

ART UNIT	PAPER NUMBER
2614	

NOTIFICATION DATE	DELIVERY MODE
09/25/2009	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@krameramado.com  
 clewis@krameramado.com  
 catta@krameramado.com

<b>Interview Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	11/367,401		CHANDRA ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	IBRAHAM SHARIFZADA		2614	

All participants (applicant, applicant's representative, PTO personnel):

(1) IBRAHAM SHARIFZADA. (3) Olisa Anwah.

(2) Attorney Wamsley. (4) \_\_\_\_.

Date of Interview: 17 September 2009.

Type: a) ☐ Telephonic b) ☐ Video Conference  
c) ☒ Personal [copy given to: 1) ☐ applicant 2) ☒ applicant's representative]

Exhibit shown or demonstration conducted: d) ☐ Yes e) ☐ No.  
If Yes, brief description: \_\_\_\_.

Claim(s) discussed: Independent claims.

Identification of prior art discussed: Hedden and Bawa.

Agreement with respect to the claims f) ☒ was reached. g) ☐ was not reached. h) ☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: The proposed amendment of adding together the three performance values overcome the rejection of record.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

/Olisa Anwah/ Primary Examiner, Art Unit 2614	
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## UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/367,401	03/06/2006	Neeraj Chandra	ALC 3226	7790

76614	7590	01/25/2010
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Kramer & Amado, P.C.  
 1725 Duke Street  
 Suite 240  
 Alexandria, VA 22314

EXAMINER	
SHARIFZADA, IBRAHAM K	

ART UNIT	PAPER NUMBER
2614	

NOTIFICATION DATE	DELIVERY MODE
01/25/2010	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@krameramado.com  
 clewis@krameramado.com  
 catta@krameramado.com

**Office Action Summary****Application No.**

11/367,401

**Applicant(s)**

CHANDRA ET AL.

**Examiner**

IBRAHAM SHARIFZADA

**Art Unit**

2614

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --****Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 09/17/2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

Application/Control Number: 11/367,401

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### DETAILED ACTION

Receipt is acknowledged of the amendment filed on 09/17/2009 which has been entered into the file. Claims 1, 3, 5, 7-9, 11, 13-14, 16-21 are now pending.

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

**2. Claims 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Billhartz et al.**

**[US 2003/0204616].**

Re claim 1, Billhartz discloses a method of routing calls across a communication network with per-call load balancing, the method comprising: identifying at least two possible alternate routes for a new call (Paragraph [0038]; route discovery unit 50); determining a first route performance value (QoS metric) for each said possible route, for a call attribute corresponding to a bandwidth criterion (Paragraph [0053]; route metric formation unit 56); determining a second route performance value (QoS metric) for each said possible route, for a call attribute corresponding to a priority criterion (Paragraph [0053]; route metric formation unit 56); determining a third route performance value (QoS metric) for each said possible route, for a call attribute corresponding to a service category criterion (Paragraph [0053]; route metric formation unit 56); and selecting a route from the at least two possible alternate routes to carry said new call based on adding together (QoS tag value) said first route performance value, said

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second route performance value, and said third route performance value (Paragraph [0053-0054]; route selection unit 58).

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

**3. Claims 3, 13-14, 16-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Billhartz et al. [US 2003/0204616] in view of Hedden et al. [US 2002/0071542].**

Re claim 3, Billhartz fails to disclose wherein the determining of said first route performance value, said second route performance value, and said third route performance value occurs in a user-defined order.

Hedden discloses wherein the determining of said first route performance value, said second route performance value, and said third route performance value occurs in a user-defined order (Paragraph [0029]).



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Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Billhartz with determining of said first route performance value, said second route performance value, and said third route performance value occurs in a user-defined order as taught by Hedden for the purposes of increasing user flexibility in determining the best possible route, so that the user's own preferences are incorporated.

Re claim 13, Billhartz discloses a system that performs load balancing of calls in a communication network, the system comprising:

- a routing module that selects a list of possible alternate routes between a user-specified source and a destination (Paragraph [0038]; route discovery unit 50);

- a first aggregated attribute calculation unit that determines a first route performance value (QoS metric) for the list of possible alternate routes for a call attribute corresponding to a bandwidth criterion (Paragraph [0050, 0053]; route metric formation unit 56);

- a second aggregated attribute calculation unit that determines a second route performance value (QoS metric) for the list of possible alternate routes for a call attribute corresponding to a priority criterion (Paragraph [0050, 0053]; route metric formation unit 56);

- a third aggregated attribute calculation unit that determines a third route performance value (QoS metric) for the list of possible alternate routes for a call attribute corresponding to a service category criterion (Paragraph [0050, 0053]; route metric formation unit 56); and

- a route selector (route selection unit 58) that selects a route for a new call from said list of possible alternate routes, based on adding together said first route performance value, said

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second route performance value, and said third route performance value (Paragraph [0050, 0053-0054]).

Billhartz fails to disclose a load balancing criteria module that receives a configuration form from a user that specifies selection criteria used for load balancing; a link attribute processing unit that receives the selection criteria from the load balancing criteria module and the list of possible alternate routes from the routing module.

Hedden discloses a load balancing criteria module that receives a configuration form from a user that specifies selection criteria used for load balancing (Paragraph [0029, 0035]); a link attribute processing unit that receives the selection criteria from the load balancing criteria module and the list of possible alternate routes from the routing module (Paragraph [0029, 0035]);

Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Billhartz with a load balancing criteria module and link attribute processing unit as taught by Hedden for the purposes of increasing user flexibility in determining the best possible route, so that the user's own preferences are incorporated.

Claim 14 is rejected for the same reasons as claim 13.

Re claim 16, Billhartz discloses wherein each of the aggregated attribute calculation units assigns a weight to each route performance value (Paragraph [0053]).

Billhartz fails to disclose that it is based on user-specified preferences for each route performance value.

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Hedden discloses wherein each of the aggregated attribute calculation units assigns a weight to each route performance value, based on user-specified preferences for each route performance value (Paragraph [0035]).

Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Billhartz with each of the aggregated attribute calculation units assigns a weight to each route performance value, based on user-specified preferences for each route performance value as taught by Hedden for the purposes of increasing user flexibility in determining the best possible route, so that the user's own preferences are incorporated.

Re claim 17, Billhartz discloses wherein different weights are assigned to at least two of the route performance values (Paragraph [0053]).

Re claim 18, Billhartz fails to disclose assigning a weight to each route performance value based on user-specified preferences for each route performance value.

Hedden discloses assigning a weight to each route performance value based on user-specified preferences for each route performance value (Paragraph [0035]).

Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Billhartz with user-specified preferences for weights as taught by Hedden for the purposes of increasing user flexibility in determining the best possible route, so that the user's own preferences are incorporated.

Claim 19 is rejected for the same reasons as claim 17.

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Re claim 20, Billhartz fails to disclose wherein each of the aggregated attribute calculation units assigns a weight to each route performance value based on user-specified preferences for each route performance value.

Hedden discloses wherein each of the aggregated attribute calculation units assigns a weight to each route performance value based on user-specified preferences for each route performance value (Paragraph [0035]).

Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Billhartz with user-specified preferences for weights as taught by Hedden for the purposes of increasing user flexibility in determining the best possible route, so that the user's own preferences are incorporated.

Claim 21 is rejected for the same reasons as claim 17.

**4. Claims 5, 7, 9, 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Billhartz et al. [US 2003/0204616] in view of Bawa et al. [US 6697333].**

Re claim 5, Billhartz fails to fully disclose wherein determining the third route performance value further comprises: counting for each link of said at least two possible alternate routes a number of calls-in-progress that have said call attribute; calculating an aggregated attribute by summing the number of calls-progress for said at least two possible alternate routes; and determining said third route performances value by dividing said aggregated attribute to the number of hops along said respective possible route.

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However, Bawa discloses wherein determining the third route performance value further comprises: counting for each link of said at least two possible alternate routes a number of calls-in-progress that have said call attribute (col. 3 lines 28-65); calculating an aggregated attribute by summing the number of calls-progress for said at least two possible alternate routes (col. 3 lines 28-65); and determining said third route performances value by dividing said aggregated attribute to the number of hops along said respective possible route (col. 3 lines 28-65).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Billhartz with a route calculation algorithm as taught by Bawa for the purposes of determining the status of the network links and routes so as to better decide which route to choose from.

Re claim 7, Billhartz fails to fully disclose wherein determining the first route performance value further comprises: calculating an aggregated bandwidth by summing bandwidth consumed by all calls-in-progress along each link of said at least two possible alternate routes; and determining said first route performance value by dividing said aggregated bandwidth to a number of hops along said at least two possible alternate routes.

However, Bawa discloses wherein determining the first route performance value further comprises: calculating an aggregated bandwidth by summing bandwidth consumed by all calls-in-progress along each link of said at least two possible alternate routes (col. 3 lines 28-65); and determining said first route performance value by dividing said aggregated bandwidth to a number of hops along said at least two possible alternate routes (col. 3 lines 28-65).

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Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Billhartz with a route calculation algorithm as taught by Bawa for the purposes of determining the status of the network links and routes so as to better decide which route to choose from.

Re claim 9, Billhartz fails to fully disclose re-routing a call-in-progress established along a current route across said network between a source and a destination to the selected route.

However, Bawa discloses re-routing a call-in-progress established along a current route across said network between a source and a destination to the selected route (col. 4 lines 1-19).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Billhartz with the ability to re-route in progress calls as taught by Bawa for the purposes of ensuring that a call is maintained even if the route it is being transmitted through degrades in quality or becomes over congested.

Re claim 11, Billhartz fails to fully disclose wherein the re-routing of the call-in-progress is determined without considering any route performance values for said current route.

However, Bawa discloses wherein the re-routing of the call-in-progress is determined without considering any route performance values for said current route (col. 2 lines 49-54).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Billhartz with the re-routing of the call-in-progress is determined without considering any route performance values for said current route as taught by Bawa for

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the purposes of enabling the user to select the best route available regardless of whether the current route is performing at a high enough level.

**5. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Billhartz et al. [US 2003/0204616] in view of Imai [US 7443800].**

Re claim 8, Billhartz fails to fully disclose wherein determining the first route performance value further comprises: calculating for each link of said at least two possible alternate routes a consumed link bandwidth by summing bandwidth consumed by all calls-in-progress along said links; calculating a link bandwidth value by dividing said consumed link bandwidth by link bandwidth capacity; and determining said first route performance value by summing said link bandwidth values for all links of said at least two possible alternate routes.

However, Imai discloses wherein determining the first route performance value further comprises: calculating for each link of said at least two possible alternate routes a consumed link bandwidth by summing bandwidth consumed by all calls-in-progress along said links (col. 3 line 56 – col. 4 line 4); calculating a link bandwidth value by dividing said consumed link bandwidth by link bandwidth capacity (col. 3 line 56 – col. 4 line 4); and determining said first route performance value by summing said link bandwidth values for all links of said at least two possible alternate routes (col. 4 lines 5-15).

Thus it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Billhartz with an algorithm that uses bandwidth capacity ratios as taught by Imai for the purposes of enabling a better route selection algorithm to determine the best possible route.

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***Response to Arguments***

6. Applicant's arguments with respect to claims 1, 13, 14 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IBRAHAM SHARIFZADA whose telephone number is (571)270-7142. The examiner can normally be reached on Monday-Friday, 7:30am-5:00pm.



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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, FAN TSANG can be reached on (571)272-7547. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/IBRAHAM SHARIFZADA/  
Examiner, Art Unit 2614

/Fan Tsang/  
Supervisory Patent Examiner, Art Unit  
2614

<b>Notice of References Cited</b>	Application/Control No. 11/367,401		Applicant(s)/Patent Under Reexamination CHANDRA ET AL.	
	Examiner IBRAHAM SHARIFZADA		Art Unit 2614	Page 1 of 1

**U.S. PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2002/0071542	06-2002	Hedden, Ralph Coleman	379/221.02
*	B	US-2006/0002368	01-2006	Budampati et al.	370/351
*	C	US-6,697,333	02-2004	Bawa et al.	370/238
*	D	US-7,443,800	10-2008	Imai, Tetsuo	370/238
*	E	US-2003/0204616	10-2003	Billhartz et al.	709/235
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			


**FOREIGN PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

**NON-PATENT DOCUMENTS**


*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

<b><i>Index of Claims</i></b>  	<b>Application/Control No.</b>  11367401	<b>Applicant(s)/Patent Under Reexamination</b>  CHANDRA ET AL.
	<b>Examiner</b>  IBRAHAM SHARIFZADA	<b>Art Unit</b>  2614

✓	<b>Rejected</b>	-	<b>Cancelled</b>	N	<b>Non-Elected</b>	A	<b>Appeal</b>
=	<b>Allowed</b>	÷	<b>Restricted</b>	I	<b>Interference</b>	O	<b>Objected</b>

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant				<input type="checkbox"/> CPA		<input type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47	
CLAIM		DATE							
Final	Original	08/27/2009	12/19/2009						
	1	✓	✓						
	2	✓	✓						
	3	✓	✓						
	4	✓	✓						
	5	✓	✓						
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	15	✓	✓						
	16	✓	✓						
	17		✓						
	18		✓						
	19		✓						
	20		✓						
	21		✓						

<b>Search Notes</b>  	<b>Application/Control No.</b>  11367401	<b>Applicant(s)/Patent Under Reexamination</b>  CHANDRA ET AL.
	<b>Examiner</b>  IBRAHAM SHARIFZADA	<b>Art Unit</b>  2614

SEARCHED			
Class	Subclass	Date	Examiner
370	238	8/27/2009	I.S.
379	221.01-221.04	8/27/2009	I.S.

SEARCH NOTES		
Search Notes	Date	Examiner
EAST Search History	8/27/2009	I.S.
EAST Search History	12/19/2009	I.S.

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

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## EAST Search History

## EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	1	("6697333").PN.	US-PGPUB; USPAT	OR	OFF	2009/08/26 08:02
S2	27	("5233604"   "5699347"   "5940372"   "6044075"   "6084858"   "6104701"   "6141319"   "6195354"   "6256309"   "6370119").PN. OR ("6697333").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/08/26 08:49
S3	0	S2 and (user defin\$4)	US-PGPUB; USPAT	ADJ	ON	2009/08/26 09:29
S4	500	(379/219-221.07.ccls. or 370/229-240.ccls.) and (user defin\$4)	US-PGPUB; USPAT	ADJ	ON	2009/08/26 09:36
S5	63	(379/221.01.ccls. or 370/238. ccls.) and (user defin\$4)	US-PGPUB; USPAT	ADJ	ON	2009/08/26 09:37
S6	82	S4 and hop and bandwidth	US-PGPUB; USPAT	ADJ	ON	2009/08/26 09:53
S7	13	S5 and hop and bandwidth	US-PGPUB; USPAT	ADJ	ON	2009/08/26 09:53
S8	1	"20070206762"	US-PGPUB; USPAT	ADJ	ON	2009/08/26 09:55
S9	14	("20020062372"   "20030043796"   "5337352"   "5432776"   "5459837"   "5712907"   "5898668"   "5933425"   "6006264"   "6111673"   "6144641"   "6181699"   "6525851"   "6775267").PN. OR ("7027402").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/08/26 10:20
S10	14	("20020062372"   "20030043796"   "5337352"   "5432776"   "5459837"   "5712907"   "5898668"   "5933425"   "6006264"   "6111673"   "6144641"   "6181699"   "6525851"   "6775267").PN. OR ("7027402").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/08/27 08:13
S11	102	("5042027"   "5115429"   "5210740"   "5649108").PN. OR ("5933425").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/08/27 08:16
S12	2	"20020071542"	US-PGPUB; USPAT	ADJ	ON	2009/08/27 09:09

S13	28	(379/221.01.ccls. or 370/238.ccls.) and (bandwidth with divid \$4)	US-PGPUB; USPAT	ADJ	ON	2009/08/27 10:58
S14	12	(rout\$4 near5 performance) same (bandwidth and priority)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2009/12/18 21:06
S15	1	("2005/0255848").URPN.	USPAT	ADJ	ON	2009/12/18 21:15
S16	109	("5042027"   "5115429"   "5210740"   "5649108").PN. OR ("5933425").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/12/18 21:38
S17	12	S16 and ((sum\$4 or add\$4) near5 (criter\$5 or performance))	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/12/18 21:39
S18	4	S16 and ((sum\$4 or add\$3) near5 (criter\$5 or performance))	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/12/18 21:40
S19	118	("20010039210"   "20020085703"   "20020091843"   "20020105911"   "20020143971"   "20020152319"   "20020176404"   "20030002650"   "20030016653"   "20030086515"   "20030120789"   "20030223431"   "20030227878"   "20040073641"   "20040073690"   "20050064899"   "20050180323"   "20050186933"   "20050261035"   "20050278148"   "20060067486"   "20060069779"   "20070103317"   "20070133403"   "20080151886"   "20080151898"   "20080151921"   "4791660"   "5067127"   "5206903"   "5506872"   "5594740"   "5604786"   "5724405"   "5802058"   "5828747"   "5905793"   "5933425"   "5946618"   "5953312"   "5961572"   "5982873"   "6002933"   "6021178"   "6038214"   "6058163"	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/12/18 21:42

		"6061431"   "6067300"   "6073013"   "6088732"   "6122665"   "6163607"   "6173053"   "6185527"   "6192122"   "6249757"   "6256300"   "6374302"   "6381472"   "6381639"   "6421425"   "6434628"   "6453022"   "6463470"   "6463474"   "6490343"   "6498791"   "6502131"   "6526140"   "6529475"   "6529499"   "6532241"   "6546082"   "6578077"   "6601101"   "6628611"   "6647270"   "6668042"   "6678250"   "6725128"   "6754710"   "6760312"   "6760774"   "6765905"   "6778534"   "6792092"   "6798751"   "6807564"   "6857020"   "6914964"   "6954435"   "6964023"   "6973033"   "6988133"   "7003574"   "7010097"   "7010581"   "7031311"   "7031327"   "7046646"   "7075922"   "7076540"   "7076568"   "7099440"   "7103542"   "7124205"   "7170977"   "7177945"   "7184434"   "7212969"   "7251640"   "7257120"   "7260439"   "7290059"   "7359979"   "7362745").PN. OR ("7474627"   "7496661"). PN. OR ("7617337").URPN.				
S20	7	S19 and ((sum\$4 or add\$3) near5 (criter\$5 or performance))	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/12/18 21:42
S21	1885	("379".clas. or "370".clas.) and ((sum\$4 or add\$3) near5 (criter\$5 or performance))	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/12/18 21:45
S22	123	("379".clas. or "370".clas.) and (rout\$4 with (sum\$4 or add\$3) near5 (criter\$5 or performance))	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/12/18 21:46
S23	49489	((sum\$4 or add\$4) near5 (criter\$5 or performance))	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/12/22 12:51
S24	119	S23 same (rout\$4 near5 call)	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/12/22 12:53
S25	16	S23 with (rout\$4 near5 call)	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/12/22 12:53
S26	39839	((sum\$4 or add\$3) near5 (criter\$5 or performance))	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/12/22 12:54

S27	5	S26 with (rout\$4 near\$5 call)	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/12/22 12:55
S28	66	S26 same (rout\$4 near\$5 call)	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/12/22 12:56
S29	401	S26 with rout\$5	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/12/22 13:01
S30	13960	(379/219-221.07.ccls. or 370/229-240.ccls.)	US-PGPUB; USPAT	ADJ	ON	2009/12/22 13:20
S31	18	S30 and ((sum\$3 or summing or add\$3) near\$5 (criter\$5 or performance) same (bandwidth or priority))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2009/12/22 13:23
S32	1598	(bandwidth or band?width) same (priority) same (sum\$3 or summing or add\$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2009/12/23 07:35
S33	325	(bandwidth or band?width) same (priority) same (sum\$3 or summing or add\$3) same (atm or rout\$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2009/12/23 07:36
S34	45	(bandwidth or band?width) with (priority) with (sum\$3 or summing or add\$3) with (atm or rout\$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2009/12/23 07:36
S35	10	("5072379"   "5291477"   "5598532").PN. OR ("6215771").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/12/23 07:49
S36	0	S35 and (bandwidth or band? width) same (priority) same (sum\$3 or summing or add\$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2009/12/23 07:51
S37	0	S35 and (bandwidth or band? width) same (priority)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2009/12/23 07:51
S38	340	bandwidth same priority same hop	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2009/12/30 16:05



S39	47	S38 same (sum\$4 or add\$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2009/12/30 16:05
S40	42	S39 and (@ad<="20060306" or @rlad<="20060306")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2009/12/30 16:07

**12/ 31/ 2009 1:08:29 PM****C:\ Documents and Settings\ isharifzada\ My Documents\ EAST\ Workspaces\ 11367401.wsp**

**REPLY UNDER 37 C.F.R § 1.116  
EXPEDITED PROCEDURE  
TECHNOLOGY CENTER 2600**

**PATENT  
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of	:	Neeraj Chandra, et al.
	:	
For	:	MULTIPLE CRITERIA BASED
	:	LOAD BALANCING
	:	
Serial No.	:	11/367,401
	:	
Filed	:	March 9, 2006
	:	
Art Unit	:	2614
	:	
Examiner	:	Ibrahim K. Sharifzada
	:	
Atty. Docket	:	ALC 3226
	:	
Confirmation No.	:	7790

**PRE-APPEAL BRIEF REQUEST FOR REVIEW**

Mail Stop AF  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

This Pre-Appeal Brief Request for Review is in response to the Final Office Action dated January 25, 2010, and further to the Notice of Appeal filed concurrently herewith. Applicant hereby requests review of the rejections in the above-identified application in view of the concurrently-filed Notice of Appeal. Claims 1, 3, 5, 7-9, 11, 13, 14, and 16-21 are pending in the present application. Claims 1, 13, and 14 are independent.

On pages 2 and 3, the Office Action rejects claim 1 under 35 U.S.C. § 102(b) as allegedly anticipated by Pub. No. US2003/0204616 to Billhartz et al (hereinafter “Billhartz”).

Independent claim 1 recites, in part, the following subject matter: “a first route performance value for each said possible route, for a call attribute corresponding to a bandwidth criterion; determining a second route performance value for each said possible route, for a call attribute corresponding to a priority criterion; determining a third route performance value for each said possible route, for a call attribute corresponding to a service category criterion” (emphasis added). Similar subject matter appears in independent claims 13 and 14. Applicant respectfully submits that the references of record, alone or in combination, fail to disclose, suggest, or teach this subject matter.

On page 2, the Office Action equates all of these values to a “QoS metric” in Billhartz, relying upon paragraph [0053] of Billhartz. While this paragraph does indicate that a QoS parameter may be based upon bandwidth, priority, and/or other factors, Billhartz fails to disclose distinct performance values that correspond to the recited service category criterion. Moreover, Applicant respectfully submits that Billhartz only discloses a single metric, thereby clearly failing to provide the recited combination of first, second, and third route performance values.

In addition, Applicant respectfully submits that the Office Action has failed to address the recited service category criterion. Paragraph [0053] of Billhartz and route metric formation unit 56 are entirely unrelated to this subject matter. Applicant respectfully submits that Billhartz lacks service category criterion Q, defined as a set of service category levels Q1, Q2, and Q3.

Independent claim 1 further recites the following subject matter: “selecting a route from the at least two possible alternate routes to carry said new call based on adding together said first route performance value, said second route performance value, and said third route performance value” (emphasis added). Similar subject matter appears in independent claims 13 and 14. Applicant respectfully submits

that the references of record, alone or in combination, fail to disclose, suggest, or teach this subject matter.

On page 2, the Office Action relies upon the disclosure of a QoS tag value. As defined in paragraph [0053] of Billhartz, the QoS tag value “may be a weighted sum of each term, or a vector with each term as an element” (emphasis added). While Billhartz states that the QoS tag value “is a function of at least one node specific QoS metric,” Billhartz clearly does not disclose calculation of a specific sum of the three recited route performance values, including the recited service category criterion Q, to determine a QoS tag value.

On pages 3-7, the Office Action rejects independent claims 13 and 14 under 35 U.S.C. § 103(a) as allegedly unpatentable over Billhartz in view of Pub. No. US2002/0071542 to Hedden et al (hereinafter “Hedden”). Applicant respectfully submits that Hedden fails to remedy the deficiencies of Billhartz described above. Hedden does not disclose, suggest, or teach the use of three route performance values, in general, and specifically lacks any material related to service category criterion Q, defined as a set of service category levels Q1, Q2, and Q3. Because Hedden lacks the recited three route performance values, Applicant respectfully submits that Hedden also lacks any teaching of adding together those values.

Independent claim 13 recites, in part, the following subject matter: “a load balancing criteria module that receives a configuration form from a user that specifies selection criteria used for load balancing” (emphasis added). Similar subject matter appears in independent claim 14. Applicant respectfully submits that the references of record, alone or in combination, fail to disclose, suggest, or teach this subject matter.

On page 5, the Office Action correctly concedes that Billhartz fails to disclose a load balancing criteria module. To remedy this admitted deficiency, the Office Action applies paragraphs [0029] and [0035] of Hedden. While paragraph [0035] of Hedden may disclose weighted criteria, Hedden applies these criteria to four “needs”: the most economic route, the fastest route, the most secure route, and the

route that affords the highest integrity. Thus, Hedden fails to remedy the lack of the recited service category criterion Q in Billhartz.

Independent claim 14 recites, in part, the following subject matter: “a **scoring unit** that provides a route score, based on adding together said first route performance value, said second route performance value, and said third route performance value for each route in the list of possible alternate routes” (emphasis added). Applicant respectfully submits that the references of record, alone or in combination, fail to disclose, suggest, or teach this subject matter.

On page 5, the Office Action declares that “Claim 14 is rejected for the same reasons as claim 13.” In response, Applicant respectfully submits that this rejection is clearly improper. Claim 14 recites a scoring unit that is not found in claim 13. The Office Action completely fails to address this scoring unit.

Bawa and Imai also fail to remedy the deficiencies of Billhartz. Accordingly, Applicant respectfully submits that independent claims 1, 13, and 14 are allowable over the references of record. Claims 3, 5, 7-9, 11, 18, and 19 depend from claim 1. Claims 20 and 21 depend from claim 13. Claims 16 and 17 depend from claim 14. Thus, Applicant respectfully submits that claims 3, 5, 7-9, 11 and 16-21 are also allowable due to their respective dependencies from allowable claims.

Also, claim 3 recites, in part, the following subject matter: “wherein the determining of said first route performance value, said second route performance value, and said third route performance value occurs in a **user-defined order**” (emphasis added). Applicant respectfully submits that the references of record, alone or in combination, fail to disclose, suggest, or teach this subject matter.

On page 3, the Office Action correctly concedes that Billhartz fails to disclose “a user-defined order” in determination of the route performance values. To remedy this admitted deficiency, the Office Action applies paragraph [0029] of Hedden. In response, Applicant respectfully submits that Hedden actually discloses that a user may “**choose various routes**,” not that performance values are determined in a particular order.

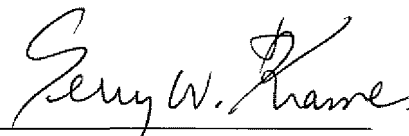
Claim 16 recites, in part, the following subject matter: “wherein each of the aggregated attribute calculation units assigns a weight to each route performance value based on user-specified preferences for each route performance value” (emphasis added). Similar subject matter appears in claims 18 and 20. Applicant respectfully submits that the references of record, alone or in combination, fail to disclose, suggest, or teach this subject matter.

On page 5, the Office Action correctly concedes that Billhartz lacks this subject matter. To remedy this admitted deficiency, page 6 of the Office Action then applies paragraph [0035] of Hedden. In response, Applicant respectfully submits that while Hedden may provide “criteria that user wants to assign to each type of message,” Hedden lacks the recited route performance values. Thus, Hedden clearly cannot assign weights to route performance values.

Accordingly, Applicant respectfully requests withdrawal of the rejections of claims 1, 3, 5, 7-9, 11, 13, 14, and 16-21 under 35 U.S.C. § 102(b) and 103(a).

In the event that the fees submitted prove to be insufficient in connection with the filing of this paper, please charge our Deposit Account Number 50-0578 and please credit any excess fees to such Deposit Account.

Respectfully submitted,  
KRAMER & AMADO, P.C.



Terry W. Kramer  
Registration No.: 41,541

Date: March 9, 2010

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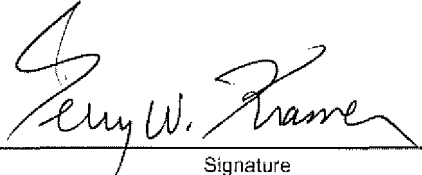
Doc Code: AP.PRE.REQ

PTO/SB/33 (06-09)

Approved for use through 07/31/2009. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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<b>PRE-APPEAL BRIEF REQUEST FOR REVIEW</b>		Docket Number (Optional)  ALC 3226	
I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to "Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)]  on _____  Signature _____  Typed or printed name _____		Application Number  11/367,401	Filed  March 6, 2006
		First Named Inventor  Neeraj Chandra, et al.	
		Art Unit  2614	Examiner  Ibrahim K. Sharifzada
<p>Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.</p> <p>This request is being filed with a notice of appeal.</p> <p>The review is requested for the reason(s) stated on the attached sheet(s).          Note: No more than five (5) pages may be provided.</p>			
I am the  <input type="checkbox"/> applicant/inventor.  <input type="checkbox"/> assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)  <input checked="" type="checkbox"/> attorney or agent of record. Registration number 41,541  <input type="checkbox"/> attorney or agent acting under 37 CFR 1.34. Registration number if acting under 37 CFR 1.34 _____		<div style="text-align: center;">             Signature            Terry W. Kramer            Typed or printed name            703-519-9801            Telephone number            March 9, 2010            Date         </div>	
NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.			
<input type="checkbox"/> *Total of _____ forms are submitted.			

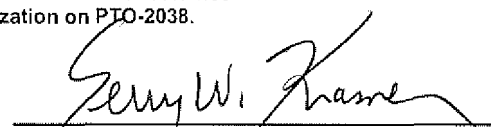
This collection of information is required by 35 U.S.C. 132. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11, 1.14 and 41.6. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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PTO/SB/31 (03-09)

Approved for use through 04/30/2009. OMB 0651-0031  
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<b>NOTICE OF APPEAL FROM THE EXAMINER TO THE BOARD OF PATENT APPEALS AND INTERFERENCES</b>		Docket Number (Optional)  ALC 3226					
I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to "Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)] on _____ Signature _____ Typed or printed name _____		In re Application of <b>Neeraj Chandra, et al.</b> <hr/> Application Number 11/367,401 <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">Filed March 6, 2006</td> <td style="width: 50%; border: none;"></td> </tr> </table> <hr/> For MULTIPLE CRITERIA BASED LOAD BALANCING <hr/> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">Art Unit 2614</td> <td style="width: 50%; border: none;">Examiner Ibrahim K. Sharifzada</td> </tr> </table>		Filed March 6, 2006		Art Unit 2614	Examiner Ibrahim K. Sharifzada
Filed March 6, 2006							
Art Unit 2614	Examiner Ibrahim K. Sharifzada						
Applicant hereby <b>appeals</b> to the Board of Patent Appeals and Interferences from the last decision of the examiner.							
The fee for this Notice of Appeal is (37 CFR 41.20(b)(1))		\$ <u>540.00</u>					
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. Therefore, the fee shown above is reduced by half, and the resulting fee is:		\$ _____					
<input type="checkbox"/> A check in the amount of the fee is enclosed.							
<input checked="" type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.							
<input type="checkbox"/> The Director has already been authorized to charge fees in this application to a Deposit Account.							
<input checked="" type="checkbox"/> The Director is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. <u>50-0578</u> .							
<input type="checkbox"/> A petition for an extension of time under 37 CFR 1.136(a) (PTO/SB/22) is enclosed.							
<b>WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.</b>							
I am the		 _____ Signature					
<input type="checkbox"/> applicant/inventor.		Terry W. Kramer _____ Typed or printed name					
<input type="checkbox"/> assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)		703-519-9801 _____ Telephone number					
<input checked="" type="checkbox"/> attorney or agent of record. Registration number <u>41,541</u>		March 9, 2010 _____ Date					
<input type="checkbox"/> attorney or agent acting under 37 CFR 1.34. Registration number if acting under 37 CFR 1.34. _____							
NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.							
<input type="checkbox"/> *Total of _____ forms are submitted.							

This collection of information is required by 37 CFR 41.31. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11, 1.14 and 41.6. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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Electronic Patent Application Fee Transmittal				
<b>Application Number:</b>		11367401		
<b>Filing Date:</b>		06-Mar-2006		
<b>Title of Invention:</b>		Multiple criteria based load balancing		
<b>First Named Inventor/Applicant Name:</b>		Neeraj Chandra		
<b>Filer:</b>		Terry Wayne Kramer/Wendy Pickrell		
<b>Attorney Docket Number:</b>		ALC 3226		
Filed as Large Entity				
<b>Utility under 35 USC 111(a) Filing Fees</b>				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Basic Filing:</b>				
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
Notice of appeal	1401	1	540	540
<b>Post-Allowance-and-Post-Issuance:</b>				
<b>Extension-of-Time:</b>				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Total in USD (\$)				540

**Electronic Acknowledgement Receipt**

<b>EFS ID:</b>	7185833
<b>Application Number:</b>	11367401
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	7790
<b>Title of Invention:</b>	Multiple criteria based load balancing
<b>First Named Inventor/Applicant Name:</b>	Neeraj Chandra
<b>Customer Number:</b>	76614
<b>Filer:</b>	Terry Wayne Kramer/Wendy Pickrell
<b>Filer Authorized By:</b>	Terry Wayne Kramer
<b>Attorney Docket Number:</b>	ALC 3226
<b>Receipt Date:</b>	11-MAR-2010
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**File Listing:**

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
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1	Pre-Brief Conference request	ALC3226PreAppealBrief.pdf	181459 c0bd488e4c5d6884455bd7764c66b1db2b9e60e6	no	5
<b>Warnings:</b>					
<b>Information:</b>					
2	Pre-Brief Conference request	ALC3226PreAppealBriefRequestForReview.pdf	44922 5c27f93bbe720647bffe9025ea1f2c01ef827df	no	1
<b>Warnings:</b>					
<b>Information:</b>					
3	Notice of Appeal Filed	ALC3226NoticeOfAppeal.pdf	51468 8b0707dc88c3a6c1dc66d3770b450cbb87721156	no	1
<b>Warnings:</b>					
<b>Information:</b>					
4	Fee Worksheet (PTO-875)	fee-info.pdf	29709 2a45d7605f6ce5e9e40582a585e383d097075171	no	2
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			307558		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

**New Applications Under 35 U.S.C. 111**

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



## UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/367,401	03/06/2006	Neeraj Chandra	ALC 3226	7790
76614	7590	05/26/2010		
Terry W. Kramer, Esq. Kramer & Amado, P.C. 1725 Duke Street, Suite 240 Alexandria, VA 22314			EXAMINER SHARIFZADA, IBRAHAM K	
			ART UNIT 2614	PAPER NUMBER
			MAIL DATE 05/26/2010	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Notice of Panel Decision from Pre-Appeal Brief Review</b>	Application/Control No.	Applicant(s)/Patent under Reexamination	
	11/367,401	CHANDRA ET AL.	
	IBRAHAM SHARIFZADA	Art Unit	
		2614	

This is in response to the Pre-Appeal Brief Request for Review filed .

1. ☐ **Improper Request** – The Request is improper and a conference will not be held for the following reason(s):

- ☐ The Notice of Appeal has not been filed concurrent with the Pre-Appeal Brief Request.
- ☐ The request does not include reasons why a review is appropriate.
- ☐ A proposed amendment is included with the Pre-Appeal Brief request.
- ☐ Other: .

The time period for filing a response continues to run from the receipt date of the Notice of Appeal or from the mail date of the last Office communication, if no Notice of Appeal has been received.

2. ☐ **Proceed to Board of Patent Appeals and Interferences** – A Pre-Appeal Brief conference has been held. The application remains under appeal because there is at least one actual issue for appeal. Applicant is required to submit an appeal brief in accordance with 37 CFR 41.37. The time period for filing an appeal brief will be reset to be one month from mailing this decision, or the balance of the two-month time period running from the receipt of the notice of appeal, whichever is greater. Further, the time period for filing of the appeal brief is extendible under 37 CFR 1.136 based upon the mail date of this decision or the receipt date of the notice of appeal, as applicable.

☐ The panel has determined the status of the claim(s) is as follows:

Claim(s) allowed: \_\_\_\_\_.

Claim(s) objected to: \_\_\_\_\_.

Claim(s) rejected: \_\_\_\_\_.

Claim(s) withdrawn from consideration: \_\_\_\_\_.

3. ☐ **Allowable application** – A conference has been held. The rejection is withdrawn and a Notice of Allowance will be mailed. Prosecution on the merits remains closed. No further action is required by applicant at this time.

4. ☒ **Reopen Prosecution** – A conference has been held. The rejection is withdrawn and a new Office action will be mailed. No further action is required by applicant at this time.

All participants:

(1) IBRAHAM SHARIFZADA.

(3)\_\_\_\_\_.

(2) Fan Tsang.

(4)\_\_\_\_\_.

/Fan Tsang/  
Supervisory Patent Examiner, Art  
Unit 2614



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/367,401	03/06/2006	Neeraj Chandra	ALC 3226	7790

76614 7590 08/04/2010  
 Terry W. Kramer, Esq.  
 Kramer & Amado, P.C.  
 1725 Duke Street, Suite 240  
 Alexandria, VA 22314

EXAMINER
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SHARIFZADA, IBRAHAM K

ART UNIT	PAPER NUMBER
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2614

NOTIFICATION DATE	DELIVERY MODE
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08/04/2010

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@krameramado.com  
 clewis@krameramado.com  
 catta@krameramado.com

**Office Action Summary****Application No.**

11/367,401

**Applicant(s)**

CHANDRA ET AL.

**Examiner**

IBRAHAM SHARIFZADA

**Art Unit**

2614

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --****Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11 March 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,3,5,7-9,11,13,14 and 16-21 is/are pending in the application.
- 4a) Of the above claim(s) 2, 4, 6, 10, 12, 15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3,5,7-9,11,13,14 and 16-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |



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### DETAILED ACTION

Receipt is acknowledged for the amendment filed on 03/11/2010 which has been entered into the file. Claims 1, 3, 5, 7-9, 11, 13, 14, 16-21 are now pending.

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. **Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Billhartz et al. [US 2003/0204616].**

Re claim 1, Billhartz discloses Re claim 1, Billhartz discloses discloses a method of routing calls across a communication network with per-call load balancing, the method comprising:

identifying at least two possible alternate routes for a new call (Paragraph [0038]; route discovery unit 50);

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determining a first route performance value (QoS metric) for each said possible route, for a call attribute corresponding to a bandwidth criterion (Paragraph [0053]; Billhartz discloses the metric may include available power, available bandwidth by the node, recent error rate, recent delay, available bandwidth by other nodes within a range, and node queue size);

determining a second route performance value (QoS metric) for each said possible route, (Paragraph [0053]; Billhartz discloses the metric may include available power, available bandwidth by the node, recent error rate, recent delay, available bandwidth by other nodes within a range, and node queue size);

determining a third route performance value (QoS metric) for each said possible route, (Paragraph [0053]; Billhartz discloses the metric may include available power, available bandwidth by the node, recent error rate, recent delay, available bandwidth by other nodes within a range, and node queue size);

and selecting a route from the at least two possible alternate routes to carry said new call based on adding together (QoS tag value is a function of the weighted sum of the QoS metric values) said first route performance value, said second route performance value, and said third route performance value (Paragraph [0053-0054]; route selection unit 58).

Billhartz does not specifically disclose that determining a second and third route performance value is for a call attribute corresponding to a priority criterion and a service category criterion respectively.

However, Billhartz makes it obvious to include the QoS parameters (Paragraph [0053]; Billhartz discloses that the parameters may include bandwidth, error rate, end-to-end delay, end-to-end delay variation, hop count, expected path durability, and/or priority) as part of the QoS

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metric (Paragraph [0053]; Billhartz discloses the metric may include available power, available bandwidth by the node, recent error rate, recent delay, available bandwidth by other nodes within a range, and node queue size) since some of them overlap and since Billhartz discloses that the list is expandable to include more terms. Furthermore the QoS tag value is the weighted sum of each QoS metric term (Paragraph [0053]) and this QoS tag value is used along with the QoS parameters to determine routing information (Paragraph [0054]). In order for the QoS parameter to be met the QoS tag value (QoS metrics) must be able to calculate the values disclosed within the terms incorporated within the QoS parameter. Therefore, if a requested QoS parameter includes a specific hop count and priority then the QoS metric must be able to calculate those terms in addition to the bandwidth criterion.

Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to include the QoS parameters as part of the QoS metrics as disclosed by Billhartz for the purposes of enabling the route performance value to be calculated so that proper decision can be made as to how to properly and efficiently route a call across the network.

**4. Claims 3, 13-14, 16-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Billhartz et al. [US 2003/0204616] in view of Hedden et al. [US 2002/0071542].**

Re claim 3, Billhartz fails to disclose wherein the determining of said first route performance value, said second route performance value, and said third route performance value occurs in a user-defined order.

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Hedden discloses wherein the determining of said first route performance value, said second route performance value, and said third route performance value occurs in a user-defined order (Paragraph [0029]).

Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Billhartz with determining of said first route performance value, said second route performance value, and said third route performance value occurs in a user-defined order as taught by Hedden for the purposes of increasing user flexibility in determining the best possible route, so that the user's own preferences are incorporated.

Re claim 13, Billhartz discloses a system that performs load balancing of calls in a communication network, the system comprising:

a routing module that selects a list of possible alternate routes between a user-specified source and a destination (Paragraph [0038]; route discovery unit 50);

a first aggregated attribute calculation unit that determines a first route performance value (QoS metric) for the list of possible alternate routes for a call attribute corresponding to a bandwidth criterion (Paragraph [0050, 0053]; Billhartz discloses the metric may include available power, available bandwidth by the node, recent error rate, recent delay, available bandwidth by other nodes within a range, and node queue size);

a second aggregated attribute calculation unit that determines a second route performance value (QoS metric) for the list of possible alternate routes for a call attribute (Paragraph [0050, 0053]; Billhartz discloses the metric may include available power, available bandwidth by the

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node, recent error rate, recent delay, available bandwidth by other nodes within a range, and node queue size);

a third aggregated attribute calculation unit that determines a third route performance value (QoS metric) for the list of possible alternate routes for a call attribute (Paragraph [0050, 0053]; Billhartz discloses the metric may include available power, available bandwidth by the node, recent error rate, recent delay, available bandwidth by other nodes within a range, and node queue size); and

a route selector (route selection unit 58) that selects a route for a new call from said list of possible alternate routes, based on adding together said first route performance value, said second route performance value, and said third route performance value (Paragraph [0050, 0053-0054]; QoS tag value is a function of the weighted sum of the QoS metric values).

Billhartz does not specifically disclose that determining a second and third route performance value is for a call attribute corresponding to a priority criterion and a service category criterion respectively.

However, Billhartz makes it obvious to include the QoS parameters (Paragraph [0053]; Billhartz discloses that the parameters may include bandwidth, error rate, end-to-end delay, end-to-end delay variation, hop count, expected path durability, and/or priority) as part of the QoS metric (Paragraph [0053]; Billhartz discloses the metric may include available power, available bandwidth by the node, recent error rate, recent delay, available bandwidth by other nodes within a range, and node queue size) since some of them overlap and since Billhartz discloses that the list is expandable to include more terms. Furthermore the QoS tag value is the weighted sum of each QoS metric term (Paragraph [0053]) and this QoS tag value is used along with the QoS

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parameters to determine routing information (Paragraph [0054]). In order for the QoS parameter to be met the QoS tag value (QoS metrics) must be able to calculate the values disclosed within the terms incorporated within the QoS parameter. Therefore, if a requested QoS parameter includes a specific hop count and priority then the QoS metric must be able to calculate those terms in addition to the bandwidth criterion.

Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to include the QoS parameters as part of the QoS metrics as disclosed by Billhartz for the purposes of enabling the route performance value to be calculated so that proper decision can be made as to how to properly and efficiently route a call across the network.

Billhartz fails to disclose a load balancing criteria module that receives a configuration form from a user that specifies selection criteria used for load balancing; a link attribute processing unit that receives the selection criteria from the load balancing criteria module and the list of possible alternate routes from the routing module.

Hedden discloses a load balancing criteria module that receives a configuration form from a user that specifies selection criteria used for load balancing (Paragraph [0029, 0035]); a link attribute processing unit that receives the selection criteria from the load balancing criteria module and the list of possible alternate routes from the routing module (Paragraph [0029, 0035]);

Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Billhartz with a load balancing criteria module and link attribute processing unit as taught by Hedden for the purposes of increasing user flexibility in determining the best possible route, so that the user's own preferences are incorporated.

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Claim 14 is rejected for the same reasons as claim 13.

Re claim 16, Billhartz discloses wherein each of the aggregated attribute calculation units assigns a weight to each route performance value (Paragraph [0053]).

Billhartz fails to disclose that it is based on user-specified preferences for each route performance value.

Hedden discloses wherein each of the aggregated attribute calculation units assigns a weight to each route performance value, based on user-specified preferences for each route performance value (Paragraph [0035]).

Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Billhartz with each of the aggregated attribute calculation units assigns a weight to each route performance value, based on user-specified preferences for each route performance value as taught by Hedden for the purposes of increasing user flexibility in determining the best possible route, so that the user's own preferences are incorporated.

Re claim 17, Billhartz discloses wherein different weights are assigned to at least two of the route performance values (Paragraph [0053]).

Re claim 18, Billhartz fails to disclose assigning a weight to each route performance value based on user-specified preferences for each route performance value.

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Hedden discloses assigning a weight to each route performance value based on user-specified preferences for each route performance value (Paragraph [0035]).

Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Billhartz with user-specified preferences for weights as taught by Hedden for the purposes of increasing user flexibility in determining the best possible route, so that the user's own preferences are incorporated.

Claim 19 is rejected for the same reasons as claim 17.

Re claim 20, Billhartz fails to disclose wherein each of the aggregated attribute calculation units assigns a weight to each route performance value based on user-specified preferences for each route performance value.

Hedden discloses wherein each of the aggregated attribute calculation units assigns a weight to each route performance value based on user-specified preferences for each route performance value (Paragraph [0035]).

Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Billhartz with user-specified preferences for weights as taught by Hedden for the purposes of increasing user flexibility in determining the best possible route, so that the user's own preferences are incorporated.

Claim 21 is rejected for the same reasons as claim 17.



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**5. Claims 5, 7, 9, 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Billhartz et al. [US 2003/0204616] in view of Bawa et al. [US 6697333].**

Re claim 5, Billhartz fails to fully disclose wherein determining the third route performance value further comprises: counting for each link of said at least two possible alternate routes a number of calls-in-progress that have said call attribute; calculating an aggregated attribute by summing the number of calls-progress for said at least two possible alternate routes; and determining said third route performances value by dividing said aggregated attribute to the number of hops along said respective possible route.

However, Bawa discloses wherein determining the third route performance value further comprises: counting for each link of said at least two possible alternate routes a number of calls-in-progress that have said call attribute (col. 3 lines 28-65); calculating an aggregated attribute by summing the number of calls-progress for said at least two possible alternate routes (col. 3 lines 28-65); and determining said third route performances value by dividing said aggregated attribute to the number of hops along said respective possible route (col. 3 lines 28-65).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Billhartz with a route calculation algorithm as taught by Bawa for the purposes of determining the status of the network links and routes so as to better decide which route to choose from.

Re claim 7, Billhartz fails to fully disclose wherein determining the first route performance value further comprises: calculating an aggregated bandwidth by summing bandwidth consumed by all calls-in-progress along each link of said at least two possible

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alternate routes; and determining said first route performance value by dividing said aggregated bandwidth to a number of hops along said at least two possible alternate routes.

However, Bawa discloses wherein determining the first route performance value further comprises: calculating an aggregated bandwidth by summing bandwidth consumed by all calls-in-progress along each link of said at least two possible alternate routes (col. 3 lines 28-65); and determining said first route performance value by dividing said aggregated bandwidth to a number of hops along said at least two possible alternate routes (col. 3 lines 28-65).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Billhartz with a route calculation algorithm as taught by Bawa for the purposes of determining the status of the network links and routes so as to better decide which route to choose from.

Re claim 9, Billhartz fails to fully disclose re-routing a call-in-progress established along a current route across said network between a source and a destination to the selected route.

However, Bawa discloses re-routing a call-in-progress established along a current route across said network between a source and a destination to the selected route (col. 4 lines 1-19).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Billhartz with the ability to re-route in progress calls as taught by Bawa for the purposes of ensuring that a call is maintained even if the route it is being transmitted through degrades in quality or becomes over congested.

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Re claim 11, Billhartz fails to fully disclose wherein the re-routing of the call-in-progress is determined without considering any route performance values for said current route.

However, Bawa discloses wherein the re-routing of the call-in-progress is determined without considering any route performance values for said current route (col. 2 lines 49-54).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Billhartz with the re-routing of the call-in-progress is determined without considering any route performance values for said current route as taught by Bawa for the purposes of enabling the user to select the best route available regardless of whether the current route is performing at a high enough level.

**6. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Billhartz et al. [US 2003/0204616] in view of Imai [US 7443800].**

Re claim 8, Billhartz fails to fully disclose wherein determining the first route performance value further comprises: calculating for each link of said at least two possible alternate routes a consumed link bandwidth by summing bandwidth consumed by all calls-in-progress along said links; calculating a link bandwidth value by dividing said consumed link bandwidth by link bandwidth capacity; and determining said first route performance value by summing said link bandwidth values for all links of said at least two possible alternate routes.

However, Imai discloses wherein determining the first route performance value further comprises: calculating for each link of said at least two possible alternate routes a consumed link bandwidth by summing bandwidth consumed by all calls-in-progress along said links (col. 3 line 56 – col. 4 line 4); calculating a link bandwidth value by dividing said consumed link bandwidth

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by link bandwidth capacity (col. 3 line 56 – col. 4 line 4); and determining said first route performance value by summing said link bandwidth values for all links of said at least two possible alternate routes (col. 4 lines 5-15).

Thus it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Billhartz with an algorithm that uses bandwidth capacity ratios as taught by Imai for the purposes of enabling a better route selection algorithm to determine the best possible route.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IBRAHAM SHARIFZADA whose telephone number is (571)270-7142. The examiner can normally be reached on Monday-Friday, 7:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, FAN TSANG can be reached on (571)272-7547. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/IBRAHAM SHARIFZADA/  
Examiner, Art Unit 2614

/Fan Tsang/  
Supervisory Patent Examiner, Art Unit  
2614

<b>Notice of References Cited</b>	Application/Control No. 11/367,401		Applicant(s)/Patent Under Reexamination CHANDRA ET AL.	
	Examiner IBRAHAM SHARIFZADA		Art Unit 2614	Page 1 of 1

**U.S. PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2003/0204616	10-2003	Billhartz et al.	709/235
*	B	US-2002/0071542	06-2002	Hedden, Ralph Coleman	379/221.02
*	C	US-6,697,333	02-2004	Bawa et al.	370/238
*	D	US-7,443,800	10-2008	Imai, Tetsuo	370/238
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			


**FOREIGN PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

**NON-PATENT DOCUMENTS**


*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

<b><i>Index of Claims</i></b>  	<b>Application/Control No.</b>  11367401	<b>Applicant(s)/Patent Under Reexamination</b>  CHANDRA ET AL.
	<b>Examiner</b>  IBRAHAM SHARIFZADA	<b>Art Unit</b>  2614

✓	<b>Rejected</b>	-	<b>Cancelled</b>	N	<b>Non-Elected</b>	A	<b>Appeal</b>
=	<b>Allowed</b>	÷	<b>Restricted</b>	I	<b>Interference</b>	O	<b>Objected</b>

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant					<input type="checkbox"/> CPA					<input type="checkbox"/> T.D.					<input type="checkbox"/> R.1.47				
CLAIM		DATE																	
Final	Original	08/27/2009	12/19/2009	07/28/2010															
	1	✓	✓	✓															
	2	✓	✓	-															
	3	✓	✓	✓															
	4	✓	✓	-															
	5	✓	✓	✓															
	6	✓	✓	-															
	7	✓	✓	✓															
	8	✓	✓	✓															
	9	✓	✓	✓															
	10	✓	✓	-															
	11	✓	✓	✓															
	12	✓	✓	-															
	13	✓	✓	✓															
	14	✓	✓	✓															
	15	✓	✓	-															
	16	✓	✓	✓															
	17		✓	✓															
	18		✓	✓															
	19		✓	✓															
	20		✓	✓															
	21		✓	✓															

<b>Search Notes</b>  	<b>Application/Control No.</b>  11367401	<b>Applicant(s)/Patent Under Reexamination</b>  CHANDRA ET AL.
	<b>Examiner</b>  IBRAHAM SHARIFZADA	<b>Art Unit</b>  2614

SEARCHED			
Class	Subclass	Date	Examiner
370	238	8/27/2009	I.S.
379	221.01-221.04	8/27/2009	I.S.

SEARCH NOTES		
Search Notes	Date	Examiner
EAST Search History	8/27/2009	I.S.
EAST Search History	12/19/2009	I.S.

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

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## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
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 Alexandria, Virginia 22313-1450  
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/367,401	03/06/2006	Neeraj Chandra	ALC 3226	7790

76614 7590 08/25/2010  
 Terry W. Kramer, Esq.  
 Kramer & Amado, P.C.  
 1725 Duke Street, Suite 240  
 Alexandria, VA 22314

EXAMINER
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SHARIFZADA, IBRAHAM K

ART UNIT	PAPER NUMBER
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2614

NOTIFICATION DATE	DELIVERY MODE
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08/25/2010

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@krameramado.com  
 clewis@krameramado.com  
 catta@krameramado.com

<b>Interview Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	11/367,401		CHANDRA ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	FAN TSANG		2614	

All participants (applicant, applicant's representative, PTO personnel):

(1) FAN TSANG. (3) \_\_\_\_.

(2) Mr. Patrick Wamsley. (4) \_\_\_\_.

Date of Interview: 19 August 2010.

Type: a) ☒ Telephonic b) ☐ Video Conference  
c) ☐ Personal [copy given to: 1) ☐ applicant 2) ☐ applicant's representative]

Exhibit shown or demonstration conducted: d) ☐ Yes e) ☒ No.  
If Yes, brief description: \_\_\_\_.

Claim(s) discussed: \_\_\_\_.

Identification of prior art discussed: \_\_\_\_.

Agreement with respect to the claims f) ☒ was reached. g) ☐ was not reached. h) ☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: See Continuation Sheet.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

	/Fan Tsang/ Supervisory Patent Examiner, Art Unit 2614
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**Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record**

A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

**Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews**  
Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

**37 CFR §1.2 Business to be transacted in writing.**

All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:

- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

- 1) A brief description of the nature of any exhibit shown or any demonstration conducted,
- 2) an identification of the claims discussed,
- 3) an identification of the specific prior art discussed,
- 4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
- 5) a brief identification of the general thrust of the principal arguments presented to the examiner,  
(The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
- 6) a general indication of any other pertinent matters discussed, and
- 7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

**Examiner to Check for Accuracy**

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

Continuation of Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: Examiner agreed to withdraw the non-final action sent 8/4/10 due to improper 103 rejections. The reference to Billhartz teaches summing multiple terms or values of the QoS metric at paragraph 53 but those terms can not read on the claimed 2nd value nor the 3rd value. Billhartz's QoS parameters read on the claimed 1st, 2nd and 3rd values but no teaching for adding them together as the claims required. Examiner will perform updated search this week and will generate another proper action according to the search result.

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## NOTICE OF ALLOWANCE AND FEE(S) DUE

76614 7590 09/29/2010

Terry W. Kramer, Esq.  
 Kramer & Amado, P.C.  
 1725 Duke Street, Suite 240  
 Alexandria, VA 22314

EXAMINER

SHARIFZADA, IBRAHAM K

ART UNIT

PAPER NUMBER

2614

DATE MAILED: 09/29/2010

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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11/367,401

03/06/2006

Neeraj Chandra

ALC 3226

7790

TITLE OF INVENTION: MULTIPLE CRITERIA BASED LOAD BALANCING

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1510	\$300	\$0	\$1810	12/29/2010

**THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.**

**THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.**

**HOW TO REPLY TO THIS NOTICE:****I. Review the SMALL ENTITY status shown above.**

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

**II. PART B - FEE(S) TRANSMITTAL**, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

**III.** All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER:** Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

## PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** **Mail Stop ISSUE FEE**  
**Commissioner for Patents**  
**P.O. Box 1450**  
**Alexandria, Virginia 22313-1450**  
**or Fax** **(571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

76614 7590 09/29/2010

Terry W. Kramer, Esq.  
 Kramer & Amado, P.C.  
 1725 Duke Street, Suite 240  
 Alexandria, VA 22314

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

## Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/367,401	03/06/2006	Neeraj Chandra	ALC 3226	7790

TITLE OF INVENTION: MULTIPLE CRITERIA BASED LOAD BALANCING

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1510	\$300	\$0	\$1810	12/29/2010

EXAMINER	ART UNIT	CLASS-SUBCLASS
SHARIFZADA, IBRAHAM K	2614	379-221010

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 \_\_\_\_\_
- (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 \_\_\_\_\_
- 3 \_\_\_\_\_

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies \_\_\_\_\_

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number \_\_\_\_\_ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature \_\_\_\_\_

Date \_\_\_\_\_

Typed or printed name \_\_\_\_\_

Registration No. \_\_\_\_\_

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/367,401	03/06/2006	Neeraj Chandra	ALC 3226	7790
76614	7590	09/29/2010	EXAMINER	
Terry W. Kramer, Esq. Kramer & Amado, P.C. 1725 Duke Street, Suite 240 Alexandria, VA 22314			SHARIFZADA, IBRAHAM K	
			ART UNIT	PAPER NUMBER
			2614	
			DATE MAILED: 09/29/2010	

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**

(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 882 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 882 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

<b>Notice of Allowability</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	11/367,401	CHANDRA ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	IBRAHAM SHARIFZADA	2614	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 03/11/2010.
2. ☒ The allowed claim(s) is/are 1,3,5,7-9,11,13,14 and 16-21.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some\*    c) ☐ None    of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
- \* Certified copies not received: \_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |  |   |
|--|---|
| <p>1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)</p> <p>2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)</p> <p>3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br/>Paper No./Mail Date ____</p> <p>4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br/>of Biological Material</p> | <p>5. <input type="checkbox"/> Notice of Informal Patent Application</p> <p>6. <input type="checkbox"/> Interview Summary (PTO-413),<br/>Paper No./Mail Date ____.</p> <p>7. <input type="checkbox"/> Examiner's Amendment/Comment</p> <p>8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance</p> <p>9. <input type="checkbox"/> Other ____.</p> |
|--|---|



Application/Control Number: 11/367,401

Page 2

Art Unit: 2614

## **DETAILED ACTION**

### ***Allowable Subject Matter***

1. Claims 1, 3, 5, 7-9, 11, 13-14, 16-21 allowed.
2. The following is an examiner's statement of reasons for allowance: The prior art of record, either taken alone or in combination fails to reasonably teach or suggest "*selecting a route from the at least two possible alternate routes to carry said new call based on adding together said first route performance value, said second route performance value, and said third route performance value.*" Seid [US 5754543] discloses a matrix based multi-cost routing system in which cost factors such as delay, cost of transmission line facility and hop count are used. In addition Seid performs further arithmetic operations (such as the min or max function) on other factors such as per cent available bandwidth in order to make them additive. Seid performs summing operations on the factors but only sums each specific factor with itself. For instance, the hop counts are added together for each route choice. A matrix function is created with a plurality of factors, and instead of adding these factors together like the current application these factors are prioritized and compared with other routes, in order to determine the least costliest route. Therefore, Seid fails to disclose the current invention and the claims are allowable.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Application/Control Number: 11/367,401  
Art Unit: 2614

Page 3

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IBRAHAM SHARIFZADA whose telephone number is (571)270-7142. The examiner can normally be reached on Monday-Friday, 7:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, FAN TSANG can be reached on (571)272-7547. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/IBRAHAM SHARIFZADA/  
Examiner, Art Unit 2614

/Fan Tsang/  
Supervisory Patent Examiner, Art Unit 2614

<b>Notice of References Cited</b>	Application/Control No. 11/367,401		Applicant(s)/Patent Under Reexamination CHANDRA ET AL.	
	Examiner IBRAHAM SHARIFZADA		Art Unit 2614	Page 1 of 1

**U.S. PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-5,754,543	05-1998	Seid, Howard A.	370/351
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			


**FOREIGN PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
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**NON-PATENT DOCUMENTS**

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
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	X	

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<b>Issue Classification</b> 	<b>Application/Control No.</b> 11367401	<b>Applicant(s)/Patent Under Reexamination</b> CHANDRA ET AL.
	<b>Examiner</b> IBRAHAM SHARIFZADA	<b>Art Unit</b> 2614

ORIGINAL						INTERNATIONAL CLASSIFICATION														
CLASS			SUBCLASS			CLAIMED					NON-CLAIMED									
379			221.01			H	0	4	M	7 / 00 (2006.01.01)										
CROSS REFERENCE(S)																				
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)																			
379	221.05	221.07																		
370	237	238.1																		
709	235																			
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<input type="checkbox"/> Claims renumbered in the same order as presented by applicant <input type="checkbox"/> CPA <input type="checkbox"/> T.D. <input type="checkbox"/> R.1.47															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
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/IBRAHAM SHARIFZADA/ Examiner.Art Unit 2614  (Assistant Examiner)		<b>Total Claims Allowed:</b> 16	
/FAN TSANG/ Supervisory Patent Examiner.Art Unit 2614  (Primary Examiner)		09/12/2010 (Date)	O.G. Print Claim(s) 1
		O.G. Print Figure 1	

**EAST Search History****EAST Search History (Prior Art)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S41	96586	(least cost routing or (LCR) or bandwidth or throughput) and priori\$5 and ((class or quality) of service or (CoS or QoS))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/08/19 11:43
S42	4671	(least cost routing or (LCR) or bandwidth or throughput) same priori\$5 same ((class or quality) of service or (CoS or QoS))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/08/19 11:44
S43	2875	S42 and "370".clas.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/08/19 11:44
S47	1914	S43 and (add or adding or sum or summation or summing)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/08/19 12:22
S48	542	S43 and ((add or adding or sum or summation or summing) with bandwidth)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/08/19 12:22
S51	421	S48 and (@ad<="20060306" or @rlad<="20060306")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/08/19 12:51
S52	127	S51 and hop	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/08/19 12:55

S53	65	((add or adding or sum or summation or summing) with bandwidth with hop)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/08/19 13:00
S54	52	S53 and (@ad<="20060306" or @rlad<="20060306")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/08/19 13:00
S55	334	((add or adding or sum or summation or summing) with bandwidth with priority)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/08/19 14:36
S56	268	S55 and (@ad<="20060306" or @rlad<="20060306")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/08/19 14:36
S57	220	((add or adding or sum or summation or summing) near7 bandwidth with priority)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/08/19 14:36
S58	174	S57 and (@ad<="20060306" or @rlad<="20060306")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/08/19 14:36
S62	21	(servic\$4 categor\$4) same (load balanc\$4 or lcr or (least cost rout\$4))	US-PGPUB; USPAT; USOCR	ADJ	ON	2010/08/20 10:05
S63	6	S62 and hop	US-PGPUB; USPAT; USOCR	ADJ	ON	2010/08/20 10:14
S65	74	(call priority) same (load balanc\$4 or lcr or (least cost rout\$4))	US-PGPUB; USPAT; USOCR	ADJ	ON	2010/08/20 10:30
S66	74	S65 and (@ad<="20060306" or @rlad<="20060306")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/08/20 10:30
S67	11	(call priority) with (load balanc\$4 or lcr or (least cost rout\$4))	US-PGPUB; USPAT; USOCR	ADJ	ON	2010/08/20 10:31

S68	4963	dijkstra	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/08/20 10:44
S69	1757	S68 same rout\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/08/20 10:44
S70	3	S69 and bandwidth and (call priority)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/08/20 10:45
S71	9	(weight\$4 near5 (sum\$4 or summation or summing or add or adding)) and bandwidth and (call priority)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/08/20 10:56
S72	916	(quality of service or qos) with hop	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/08/20 10:59
S73	9	(quality of service or qos) with hop with (divid\$4 or division)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/08/20 11:00
S74	116	(plural\$4 or multipl\$4) near3 (parameter or criteri\$3) same (load balanc\$4 or lcr or (least cost rout\$4))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/08/20 11:02
S75	3566	((least cost routing or (LCR)) and ((bandwidth or throughput) and priori\$5 and ((class or quality) of service or (CoS or QoS)))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/08/20 11:04
S76	19	((least cost routing or (LCR)) and ((bandwidth or throughput) same priori\$5 same ((class or quality) of service or (CoS or QoS)))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/08/20 11:05


S77	646	(load balanc\$4) and (bandwidth same priorit\$4 same (hop or qos or cos or quality of service or class of service))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/08/20 11:09
S78	92	(load balanc\$4) same (bandwidth same priorit\$4 same (hop or qos or cos or quality of service or class of service))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/08/20 11:10
S79	84	(load balanc\$4) same (bandwidth same priorit\$4 same (hop or qos or quality of service or class of service))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/08/20 11:10

**EAST Search History (Interference)**

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<b>Search Notes</b>  	<b>Application/Control No.</b>  11367401	<b>Applicant(s)/Patent Under Reexamination</b>  CHANDRA ET AL.
	<b>Examiner</b>  IBRAHAM SHARIFZADA	<b>Art Unit</b>  2614

SEARCHED			
Class	Subclass	Date	Examiner
370	238	8/27/2009	I.S.
379	221.01-221.04	8/27/2009	I.S.

SEARCH NOTES		
Search Notes	Date	Examiner
EAST Search History	8/27/2009	I.S.
EAST Search History	12/19/2009	I.S.
EAST Search History	9/8/2010	I.S.

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner
379	221.01	9/8/2010	I.S.

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<b>Issue Classification</b> 	<b>Application/Control No.</b> 11367401	<b>Applicant(s)/Patent Under Reexamination</b> CHANDRA ET AL.
	<b>Examiner</b> IBRAHAM SHARIFZADA	<b>Art Unit</b> 2614

ORIGINAL						INTERNATIONAL CLASSIFICATION														
CLASS			SUBCLASS			CLAIMED					NON-CLAIMED									
379			221.01			H	0	4	M	7 / 00 (2006.0)										
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CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)																			
379	221.05	221.07																		
370	237	238.1																		
709	235																			

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant <input type="checkbox"/> CPA <input type="checkbox"/> T.D. <input type="checkbox"/> R.1.47															
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/IBRAHAM SHARIFZADA/ Examiner.Art Unit 2614  (Assistant Examiner)		<b>Total Claims Allowed:</b>  16	
/FAN TSANG/ Supervisory Patent Examiner.Art Unit 2614  (Primary Examiner)		09/12/2010  (Date)	O.G. Print Claim(s)  1
		O.G. Print Figure  1	



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/367,401	03/06/2006	Neeraj Chandra	ALC 3226	7790

76614	7590	12/15/2010
Terry W. Kramer, Esq. Kramer & Amado, P.C. 1725 Duke Street, Suite 240 Alexandria, VA 22314		

EXAMINER	
SHARIFZADA, IBRAHAM K	

ART UNIT	PAPER NUMBER
2614	

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APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
11367401	3/6/2006	CHANDRA ET AL.	ALC 3226

Terry W. Kramer, Esq.  
 Kramer & Amado, P.C.  
 1725 Duke Street, Suite 240  
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**EXAMINER**

IBRAHAM SHARIFZADA

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<b>Issue Classification</b> 	<b>Application/Control No.</b> 11367401	<b>Applicant(s)/Patent Under Reexamination</b> CHANDRA ET AL.
	<b>Examiner</b> IBRAHAM SHARIFZADA	<b>Art Unit</b> 2614

ORIGINAL						INTERNATIONAL CLASSIFICATION														
CLASS			SUBCLASS			CLAIMED					NON-CLAIMED									
379			221.01			H	0	4	M	7 / 00 (2006.0)										
CROSS REFERENCE(S)																				
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)																			
379	221.05	221.07																		
370	237	238.1																		
709	235																			

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant <input type="checkbox"/> CPA <input type="checkbox"/> T.D. <input type="checkbox"/> R.1.47															
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/IBRAHAM SHARIFZADA/ Examiner.Art Unit 2614  (Assistant Examiner)		<b>Total Claims Allowed:</b> 16	
/FAN TSANG/ Supervisory Patent Examiner.Art Unit 2614  (Primary Examiner)		09/12/2010 (Date)	O.G. Print Claim(s) 1
		O.G. Print Figure 1	

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 Kramer & Amado, P.C.  
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Patty Giebler (Depositor's name)  
Patty Giebler (Signature)  
12-21-10 (Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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11/367,401

03/06/2006

Neeraj Chandra

12/27/2010

HBLAND61-22000103

122325

11/367,401

TITLE OF INVENTION: MULTIPLE CRITERIA BASED LOAD BALANCING

01 FC:1501

1510.00 DA

02 FC:1504

300.00 DA

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
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nonprovisional

NO

\$1510

\$300

\$0

\$1810

12/29/2010

EXAMINER	ART UNIT	CLASS-SUBCLASS
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SHARIFZADA, IBRAHAM K

2614

379-221010

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☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

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Kramer & Amado, P.C.

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**ALCATEL LUCENT Paris, France**

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5. Change in Entity Status (from status indicated above)

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Authorized Signature

Patty Giebler  
Patty Giebler

Date

12-21-10

Typed or printed name

Registration No. \_\_\_\_\_

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Patty Giebler (Depositor's name)  
Patty Giebler (Signature)  
12-21-10 (Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/367,401	03/06/2006	Neeraj Chandra	ALC 3226	7790

TITLE OF INVENTION: MULTIPLE CRITERIA BASED LOAD BALANCING

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1510	\$300	\$0	\$1810	12/29/2010

EXAMINER	ART UNIT	CLASS-SUBCLASS
SHARIFZADA, IBRAHAM K	2614	379-221010

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

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☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

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Kramer & Amado, P.C.

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- ☐ A check is enclosed.  
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☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number 12-2325 (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature

Patty Giebler  
Patty Giebler

Date

12-21-10

Typed or printed name

Registration No. \_\_\_\_\_

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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/367,401	02/08/2011	7885398	ALC 3226	7790

76614 7590 01/19/2011

Terry W. Kramer, Esq.  
 Kramer & Amado, P.C.  
 1725 Duke Street, Suite 240  
 Alexandria, VA 22314

**ISSUE NOTIFICATION**

The projected patent number and issue date are specified above.

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**  
 (application filed on or after May 29, 2000)

The Patent Term Adjustment is 1374 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

**APPLICANT(s)** (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Neeraj Chandra, Ottawa, CANADA;  
 Gerardo Martin Espinosa, Plano, TX;



## UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

Page 1 of 1

PATENT NO. : 7,885,398 B2

APPLICATION NO.: 11/367,401

ISSUE DATE : February 8, 2011

INVENTOR(S) : Neeraj Chandra, Gerardo Martin Espinosa

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Claim 13, column 11, line 3, please change "s stem" to --system--.

### MAILING ADDRESS OF SENDER (Please do not use customer number below):

Kramer & Amado, P.C.  
1725 Duke Street, Suite 240  
Alexandria, VA 22314

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**Electronic Acknowledgement Receipt**

<b>EFS ID:</b>	9484316
<b>Application Number:</b>	11367401
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	7790
<b>Title of Invention:</b>	MULTIPLE CRITERIA BASED LOAD BALANCING
<b>First Named Inventor/Applicant Name:</b>	Neeraj Chandra
<b>Customer Number:</b>	76614
<b>Filer:</b>	Terry Wayne Kramer/Tara Jeffers
<b>Filer Authorized By:</b>	Terry Wayne Kramer
<b>Attorney Docket Number:</b>	ALC 3226
<b>Receipt Date:</b>	21-FEB-2011
<b>Filing Date:</b>	06-MAR-2006
<b>Time Stamp:</b>	11:38:49
<b>Application Type:</b>	Utility under 35 USC 111(a)

**Payment information:**

Submitted with Payment	no
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**File Listing:**

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Certificate of Correction	ALC3226_COC.pdf	29404 d88538637d3a27d43004c91b33e766ff4ca1a5f6	no	1

**Warnings:****Information:**

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

**New Applications Under 35 U.S.C. 111**

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE  
**CERTIFICATE OF CORRECTION**

PATENT NO. : 7,885,398 B2  
APPLICATION NO. : 11/367401  
DATED : February 8, 2011  
INVENTOR(S) : Neeraj Chandra and Gerardo Martin Espinosa

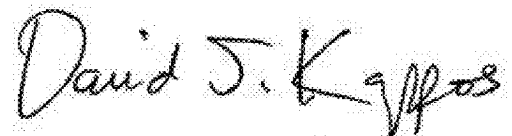
Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Claims:

Claim 13, column 11, line 3, please change "s stem" to --system--.

Signed and Sealed this  
Twenty-ninth Day of March, 2011

A handwritten signature in black ink that reads "David J. Kappos". The signature is written in a cursive, flowing style with a large initial "D" and a stylized "K".

David J. Kappos  
*Director of the United States Patent and Trademark Office*

PTO/AIA/81A (02-15)

Approved for use through 01/31/2018. OMB 0651-0035

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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<b>PATENT - POWER OF ATTORNEY OR REVOCATION OF POWER OF ATTORNEY WITH A NEW POWER OF ATTORNEY AND CHANGE OF CORRESPONDENCE ADDRESS</b>	Patent Number	7,885,398
	Issue Date	02-08-2011
	First Named Inventor	Neeraj CHANDRA et al.
	Title	MULTIPLE CRITERIA BASED LOAD BALANCING
	Attorney Docket No.	

I hereby revoke all previous powers of attorney given in the above-identified patent.

☐ A Power of Attorney is submitted herewith.

OR

☒ I hereby appoint Practitioner(s) associated with the Customer Number identified in the box at right as my/our attorney(s) or agent(s) with respect to the patent identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

151091

OR

☐ I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s) with respect to the patent identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

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Telephone

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I am the:

☐ Applicant.

OR

☒ Patent owner.☒ Statement under 37 CFR 3.73(c) (Form PTO/AIA/96) submitted herewith or filed on \_\_\_\_\_.

SIGNATURE of Applicant or Patent Owner

Signature

Date

Name

Telephone

Title and Company

Stuart Shanus

President of WSOU Investments, LLC

NOTE: Signatures of all the applicants or patent owners of the entire interest or their representative(s) are required. If more than one signature is required, submit multiple forms, check the box below, and identify the total number of forms submitted in the blank below.

☐ A total of \_\_\_\_\_ forms are submitted.

This collection of information is required by 37 CFR 1.31, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public, which is to update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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**STATEMENT UNDER 37 CFR 3.73(c)**Applicant/Patent Owner: WSOU Investments, LLCApplication No./Patent No.: 7,885,398Filed/Issue Date: 02-08-2011Titled: MULTIPLE CRITERIA BASED LOAD BALANCINGWSOU Investments, LLC, a corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose one of options 1, 2, 3 or 4 below):

1. ☒ The assignee of the entire right, title, and interest.
2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):
- ☐ The extent (by percentage) of its ownership interest is \_\_\_\_\_. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
- ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose one of options A or B below):

- A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.
- B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

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Reel 017615, Frame 0239, or for which a copy thereof is attached.2. From: ALCATEL To: ALCATEL LUCENTThe document was recorded in the United States Patent and Trademark Office at  
Reel 025764, Frame 0134, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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**STATEMENT UNDER 37 CFR 3.73(c)**3. From: ALCATEL LUCENT To: WSOU INVESTMENTS, LLCThe document was recorded in the United States Patent and Trademark Office at  
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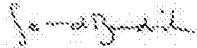
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[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

Signature



Date

September 18, 2018

Printed or Typed Name

Sean D. Burdick51,513  
IP Counsel for WSOU Investments, LLC  
Title or Registration Number

**Electronic Acknowledgement Receipt**

<b>EFS ID:</b>	34953925
<b>Application Number:</b>	11367401
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	7790
<b>Title of Invention:</b>	MULTIPLE CRITERIA BASED LOAD BALANCING
<b>First Named Inventor/Applicant Name:</b>	Neeraj Chandra
<b>Customer Number:</b>	76614
<b>Filer:</b>	Sean Dylan Burdick/Kris Pangan
<b>Filer Authorized By:</b>	Sean Dylan Burdick
<b>Attorney Docket Number:</b>	ALC 3226
<b>Receipt Date:</b>	24-JAN-2019
<b>Filing Date:</b>	06-MAR-2006
<b>Time Stamp:</b>	17:26:18
<b>Application Type:</b>	Utility under 35 USC 111(a)

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**File Listing:**

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Change of Address	11367401_Change_of_Address.pdf	292889 ed8625effde2487f65ef374fdc0ed973fc63c a35	no	1

**Warnings:**



<b>Information:</b>					
2	Power of Attorney	11367401_POA_Patent.pdf	534201	no	1
			e7537ee7270167dc52378139a3300f4ed1b3ef6a		
<b>Warnings:</b>					
<b>Information:</b>					
3	Assignee showing of ownership per 37 CFR 3.73	11367401_Statement.pdf	440084	no	2
			2913818e76c4b444b1626e22edc31cab1111fcbdb		
<b>Warnings:</b>					
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<b>Total Files Size (in bytes):</b>			1267174		
<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

PTO/SB/123 (04-15)

Approved for use through 01/31/2018. OMB 0651-0035

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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P.O. Box 1450  
Alexandria, VA 22313-1450

Patent Number	7,885,398
Issue Date	02-08-2011
Application Number	11/367,401
Filing Date	03-06-2006
First Named Inventor	Neeraj CHANDRA et al.
Attorney Docket Number	

Please change the Correspondence Address for the above-identified patent to:



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**151091**

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Firm or  
Individual Name

Address

City

State

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I am the:



Patentee.

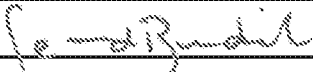


Assignee of record of the entire interest. See 37 CFR 3.71.  
Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96).



Attorney or agent of record. Registration Number 51,513.

Signature

Typed or  
Printed Name

Sean D. Burdick

Date September 18, 2018

Telephone 949-365-6722

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below\*.



\*Total of \_\_\_\_\_ forms are submitted.

This collection of information is required by 37 CFR 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Mail Stop Post Issue, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/367,401	03/06/2006	Neeraj Chandra	ALC 3226

CONFIRMATION NO. 7790

## POWER OF ATTORNEY NOTICE



\*OC000000105465892\*

76614  
 Terry W. Kramer, Esq.  
 Kramer & Amado, P.C.  
 330 John Carlyle Street  
 3rd Floor  
 Alexandria, VA 22314

Date Mailed: 01/31/2019

## NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 01/24/2019.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/dgela/

---



## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

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Alexandria, Virginia 22313-1450

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/367,401	03/06/2006	Neeraj Chandra	ALC 3226

151091

WSOU Investments, LLC

11150 Santa Monica Blvd., Suite 1400

Los Angeles, CA 90025

**CONFIRMATION NO. 7790****POA ACCEPTANCE LETTER**

\*OC000000105465914\*

Date Mailed: 01/31/2019

**NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY**

This is in response to the Power of Attorney filed 01/24/2019.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/dgela/

# **EXHIBIT E**

## **U.S. Patent No. 8,103,213**

US008103213B2

(12) **United States Patent**  
**Tolonen**

(10) **Patent No.:** **US 8,103,213 B2**  
(45) **Date of Patent:** **Jan. 24, 2012**

(54) **SOFTWARE-DEFINED RADIO  
CONFIGURATION**

(75) Inventor: **Pertti Tolonen**, Aatelikuja (FI)

(73) Assignee: **Nokia Corporation**, Espoo (FI)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 793 days.

(21) Appl. No.: **12/203,746**

(22) Filed: **Sep. 3, 2008**

(65) **Prior Publication Data**

US 2010/0056200 A1 Mar. 4, 2010

(51) **Int. Cl.**

**H04B 7/00** (2006.01)

**H04B 17/00** (2006.01)

**H04M 1/00** (2006.01)

**H04W 4/00** (2009.01)

(52) **U.S. Cl.** ... **455/39**; 455/41.2; 455/67.11; 455/552.1; 370/338

(58) **Field of Classification Search** .... 455/552.1–553.1, 455/556.1–556.2, 39, 41.2–41.3, 67.11, 515–517; 370/338, 342, 343

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2004/0023652 A1 2/2004 Shah et al.  
2004/0266404 A1\* 12/2004 Nasu et al. .... 455/414.1

2005/0053094 A1 3/2005 Cain et al.  
2005/0094589 A1\* 5/2005 Camp ..... 370/318  
2006/0073804 A1 4/2006 Tanaka et al.  
2007/0115950 A1\* 5/2007 Karaoguz et al. .... 370/356  
2007/0190938 A1\* 8/2007 Hillyard ..... 455/41.1  
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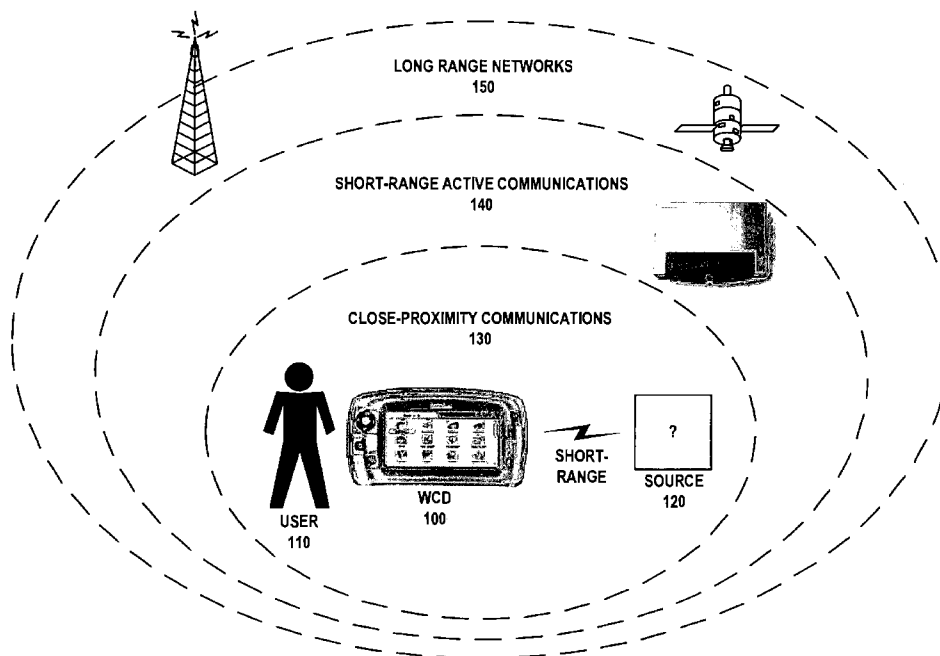
*Primary Examiner* — Simon Nguyen

(74) *Attorney, Agent, or Firm* — Locke Lord LLP

(57) **ABSTRACT**

A system for configuring communication resources that are at least partially based upon reconfigurable software modules. An apparatus may utilize a plurality of transports for communication, wherein the transports are supported by one or more radio modules. The one or more radio modules may comprise hardware-based radio modules and software-defined radio (SDR) modules including a reconfigurable software element that allows the radio module to emulate the functionality of multiple hardware-based radios. In accordance with at least one embodiment of the present invention, SDR modules in an apparatus may formulate a communication configuration for use in communicating with another apparatus based on remote characteristic information (e.g., information corresponding to the apparatus with which communication is desired) and local characteristic information pertaining to the apparatus.

**26 Claims, 23 Drawing Sheets**



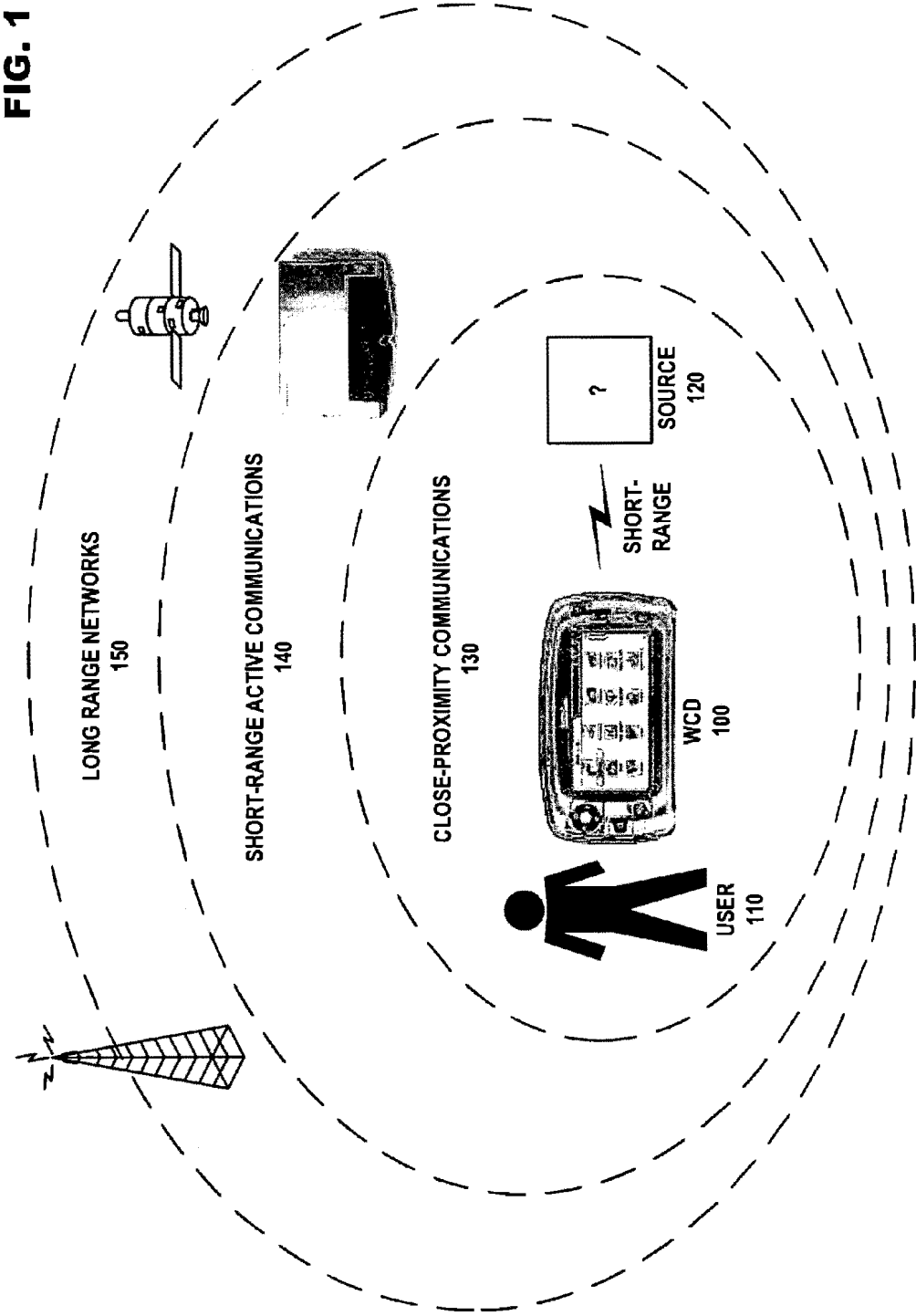
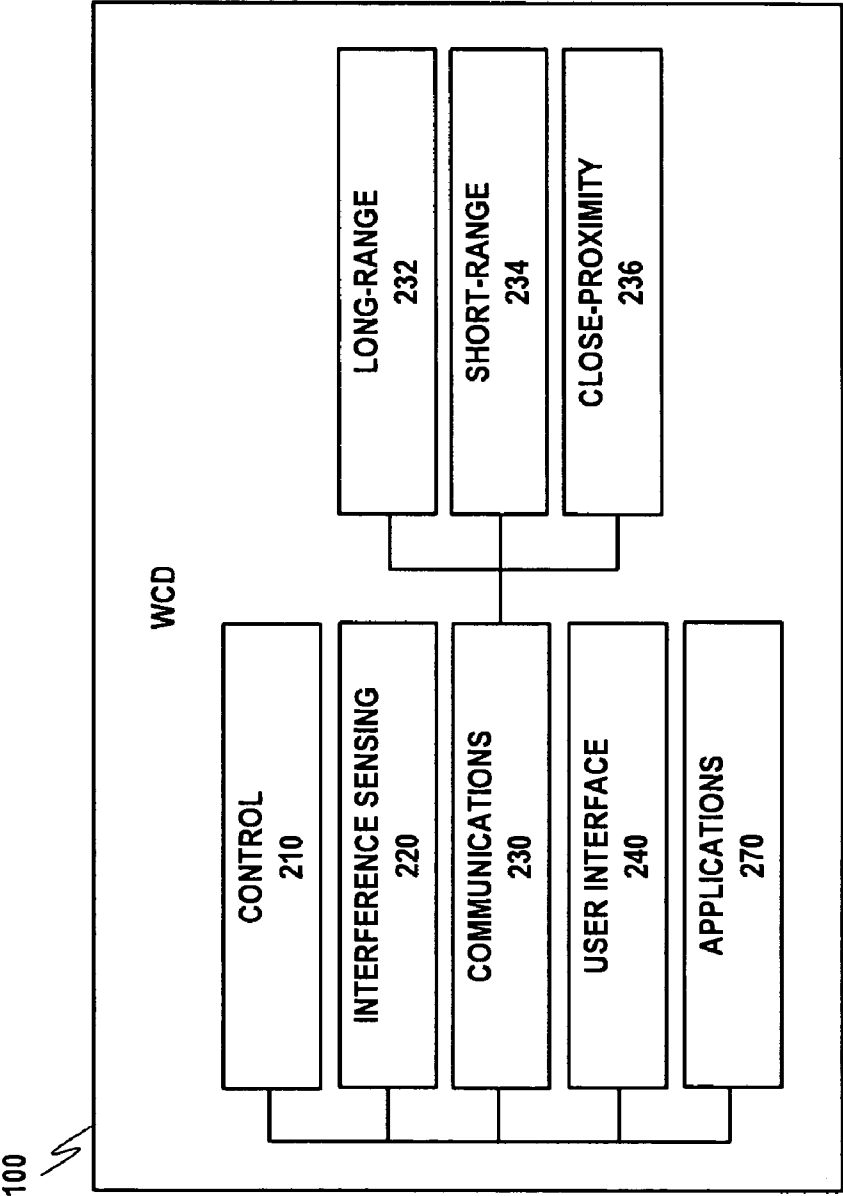
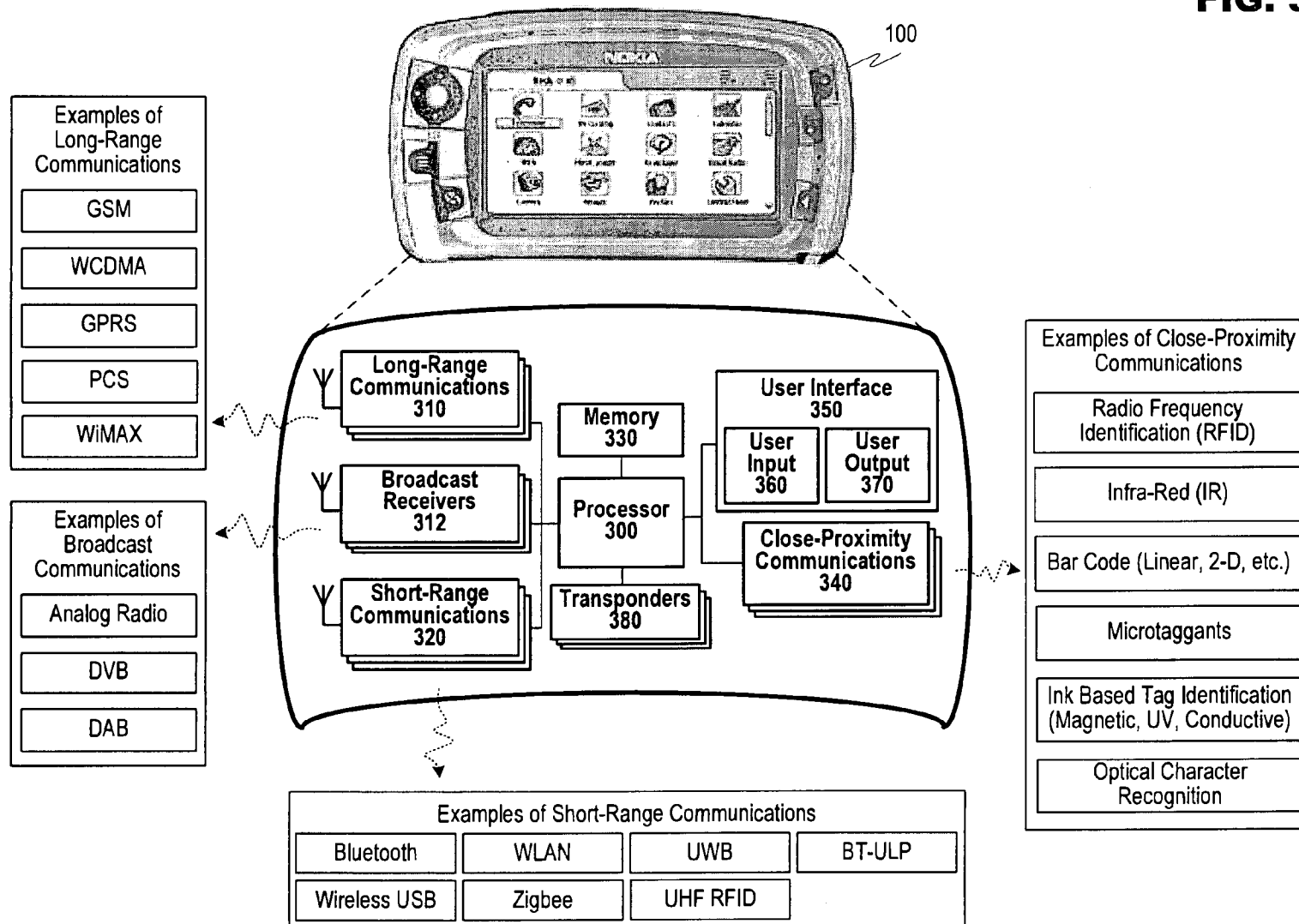
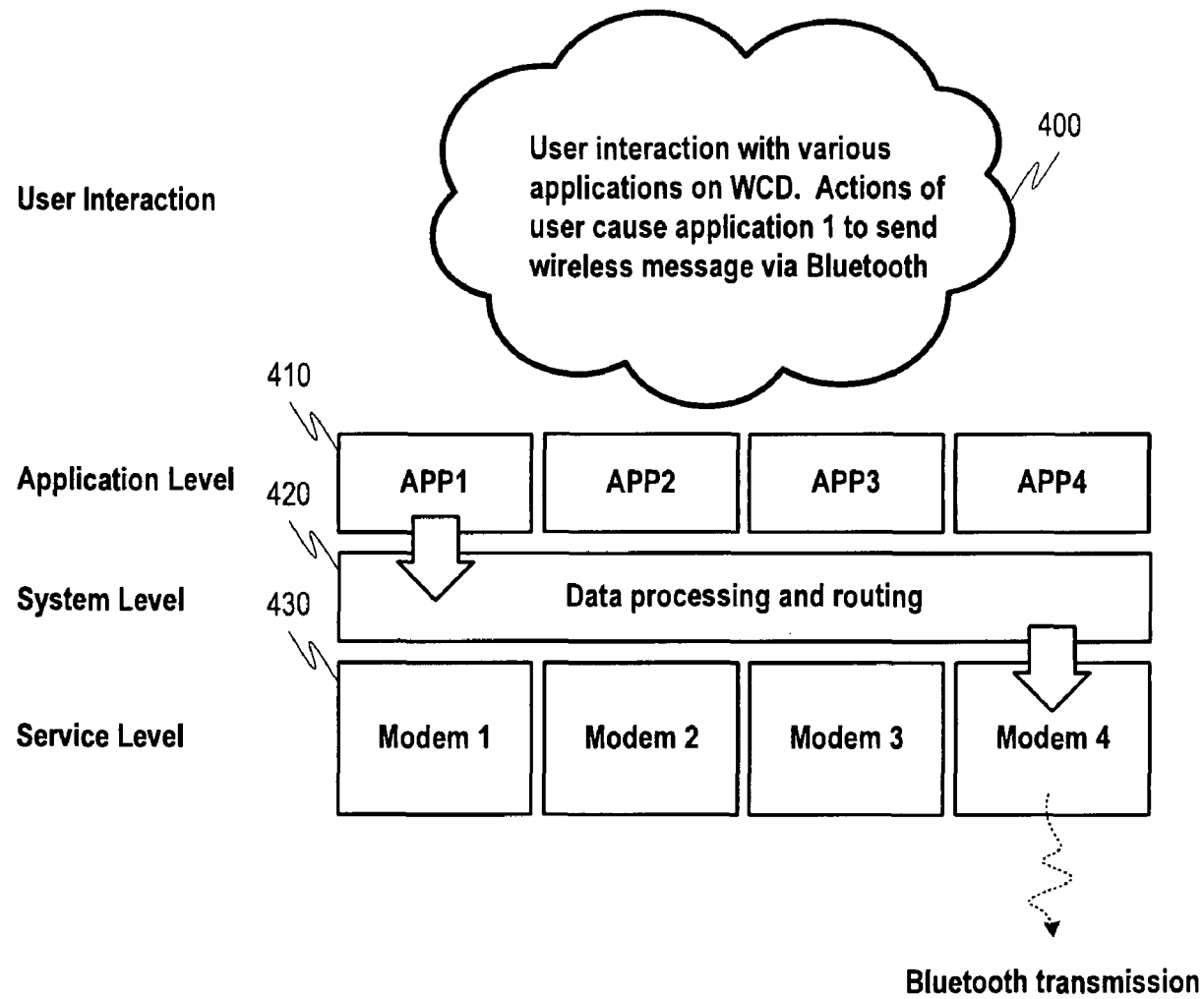


FIG. 2

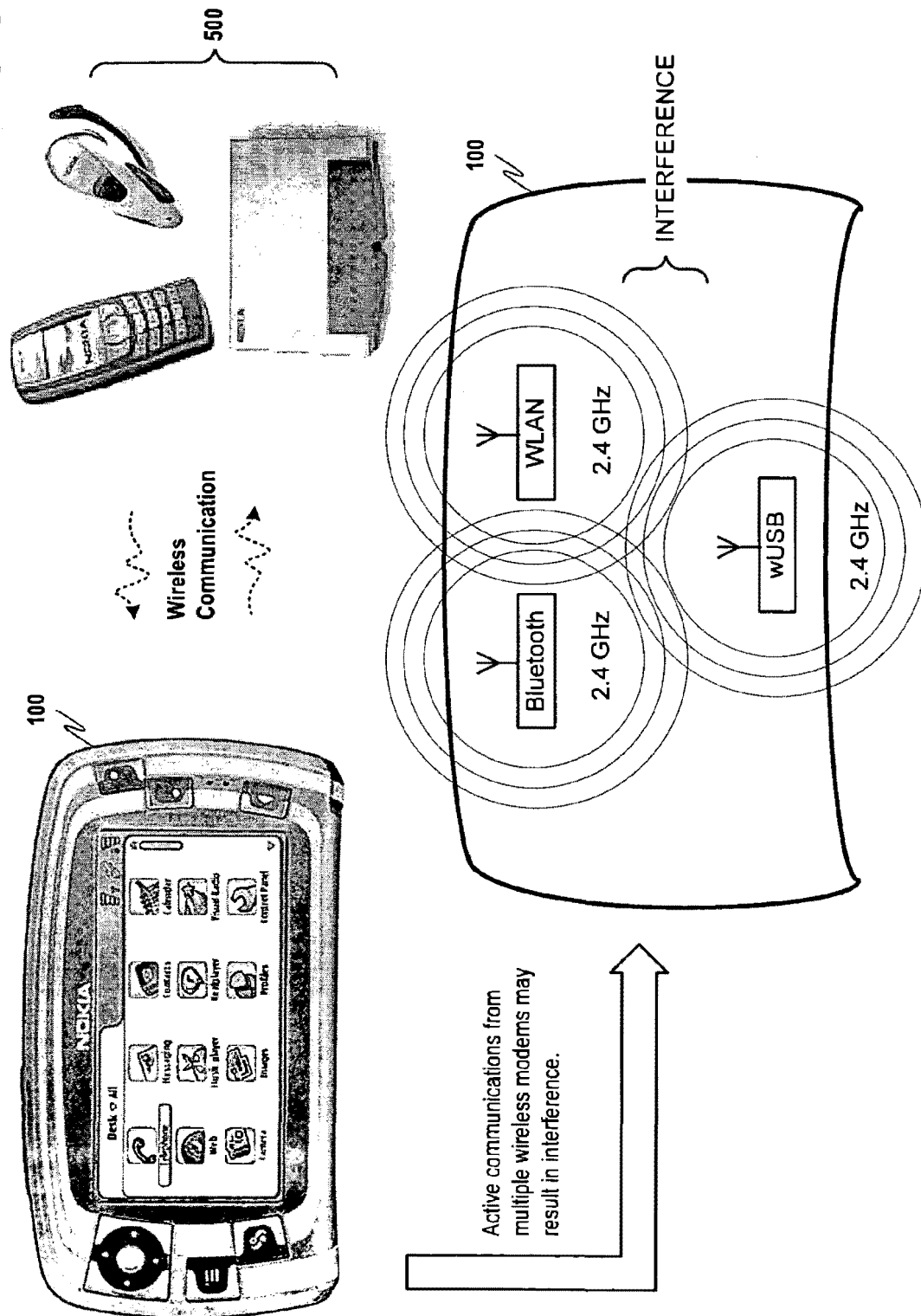




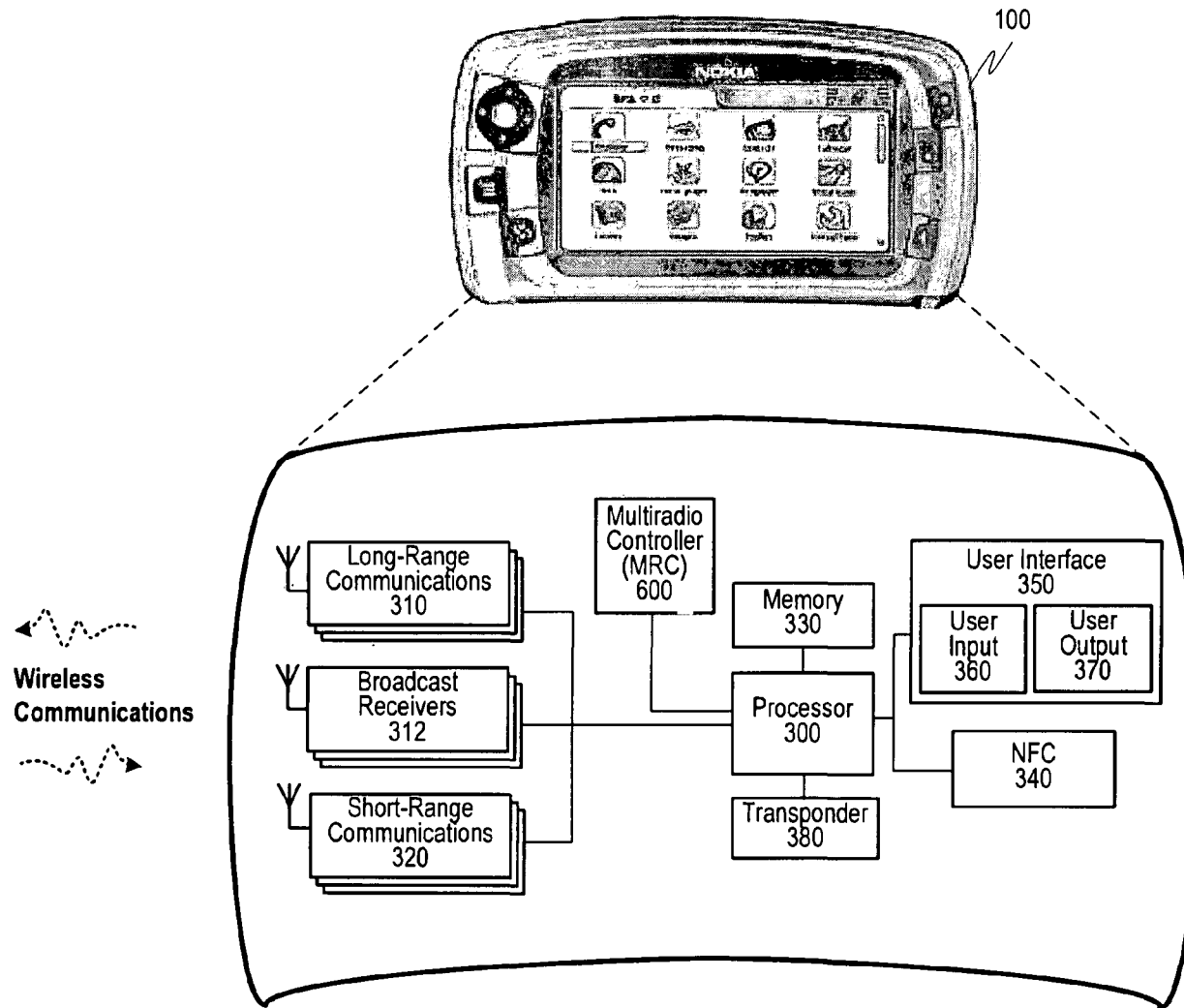
**FIG. 3**

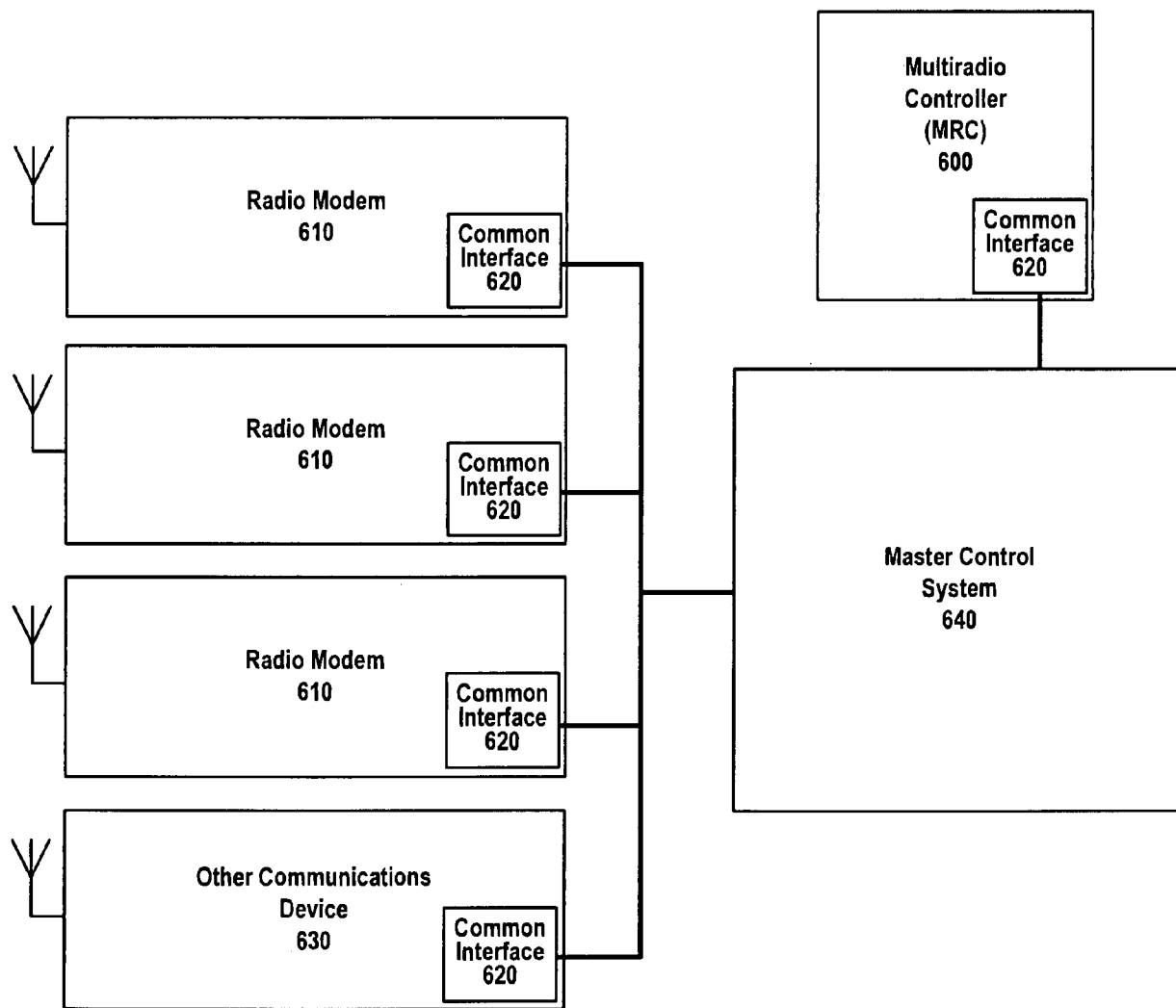
**FIG. 4**

**FIG. 5**

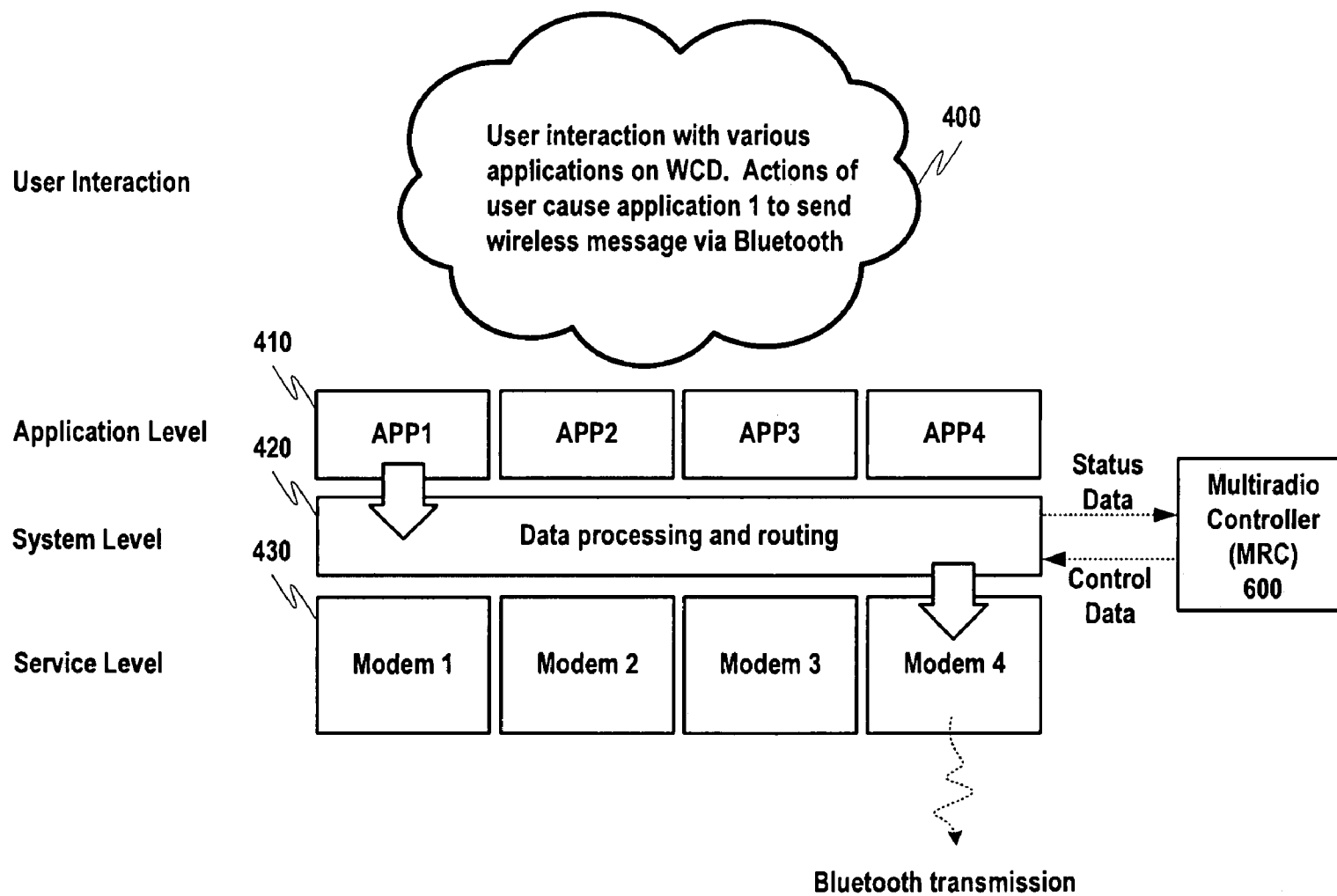


**FIG. 6A**

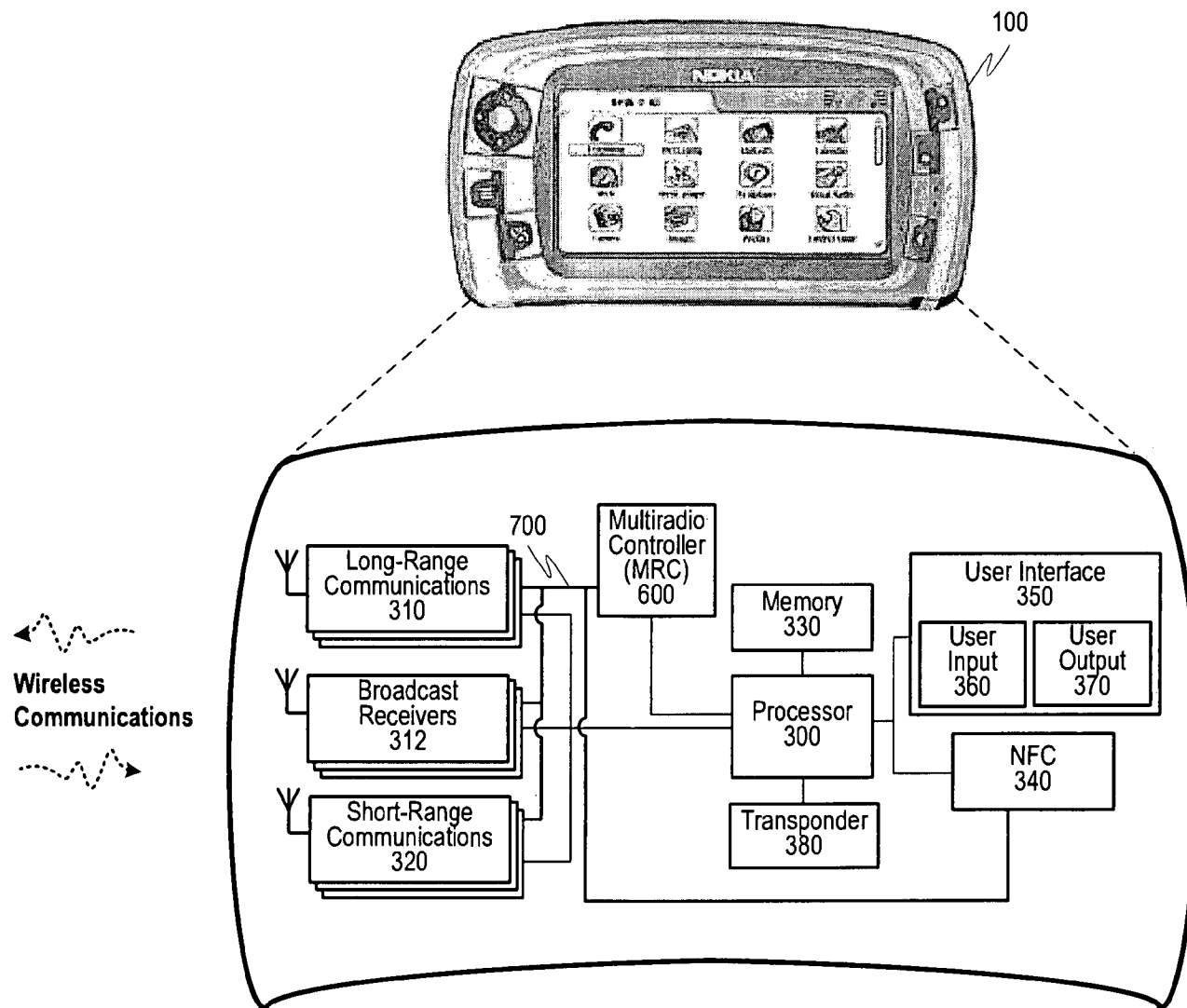


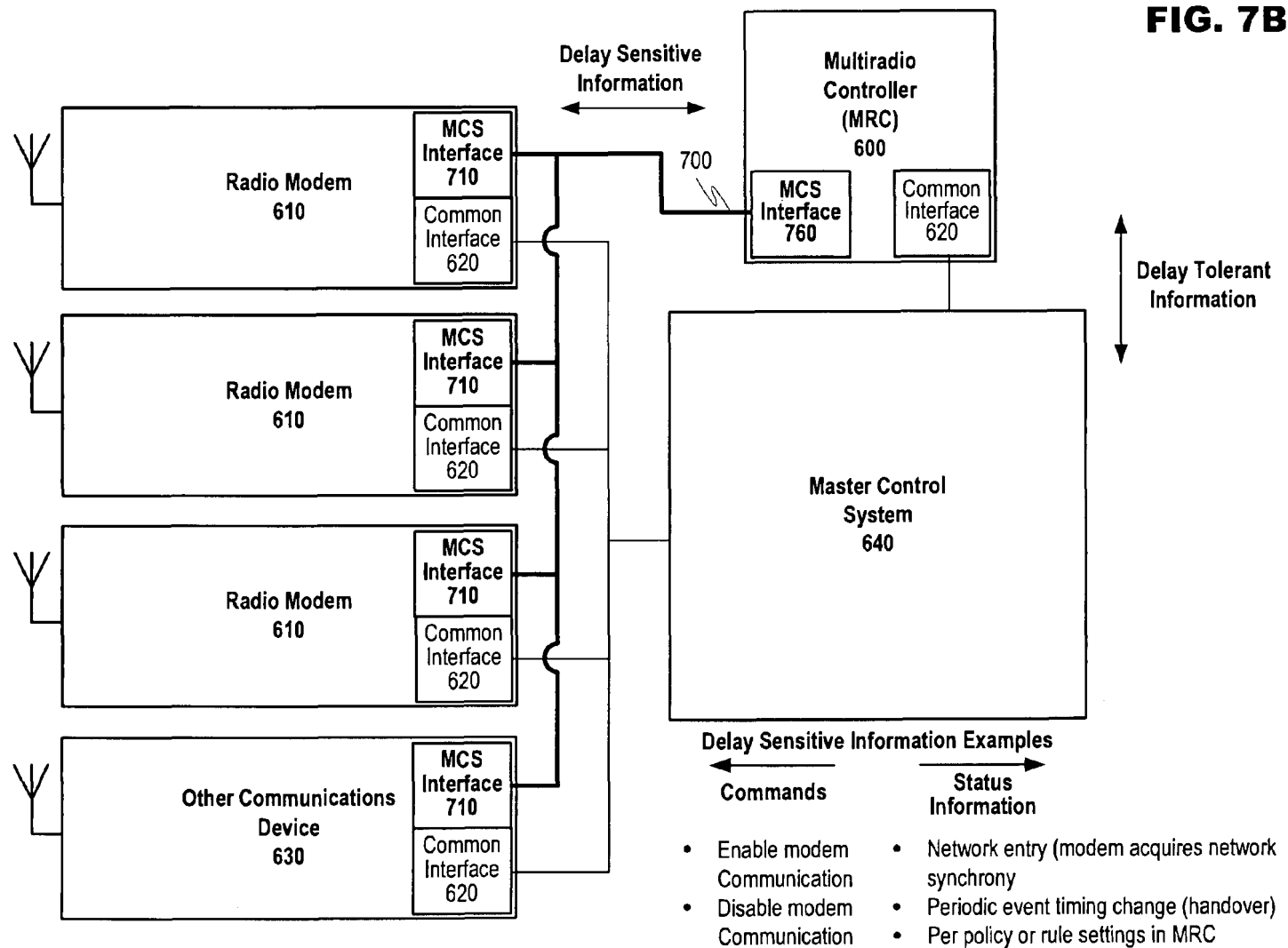


**FIG. 6B**

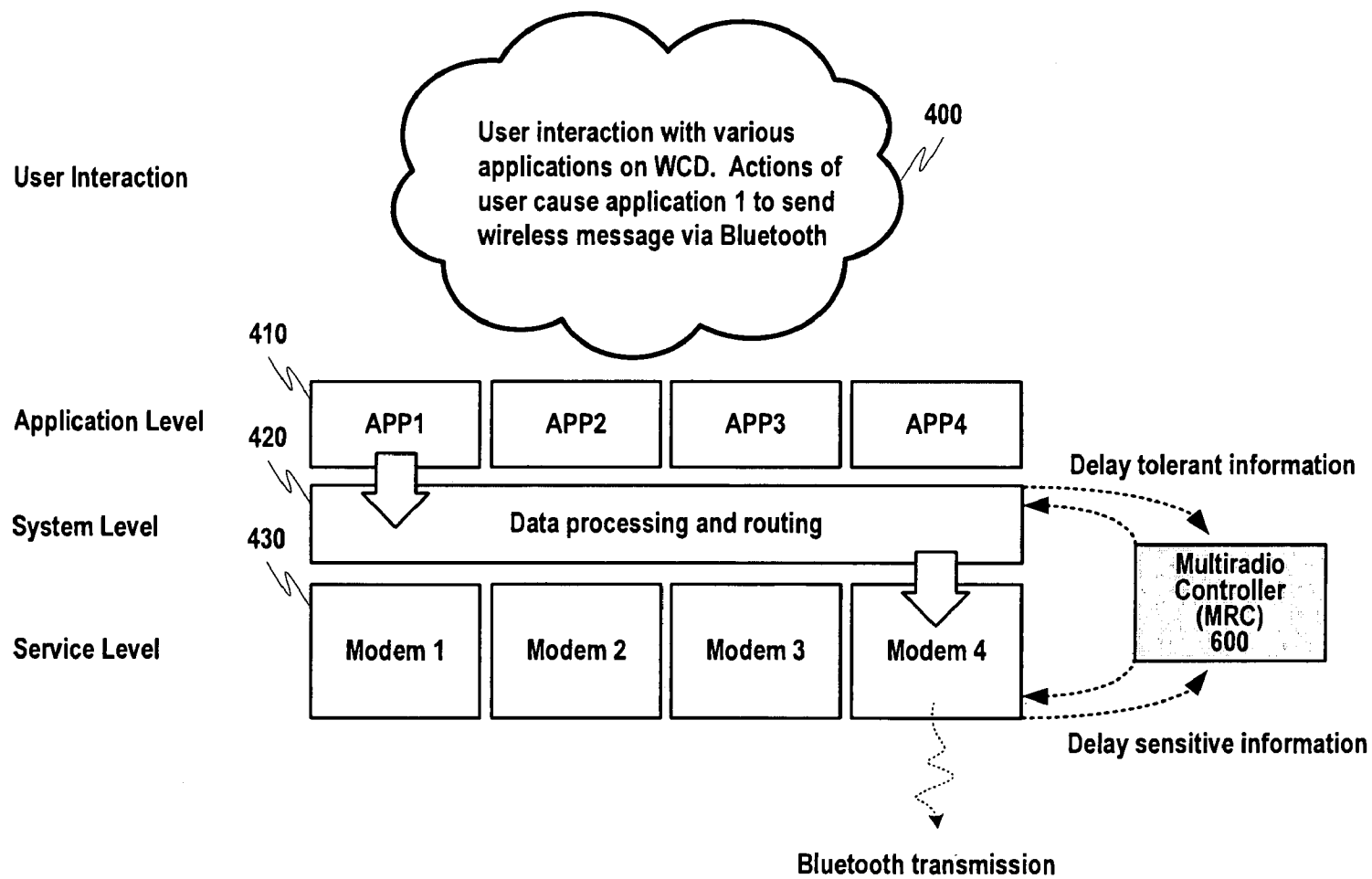
**FIG. 6C**

**FIG. 7A**

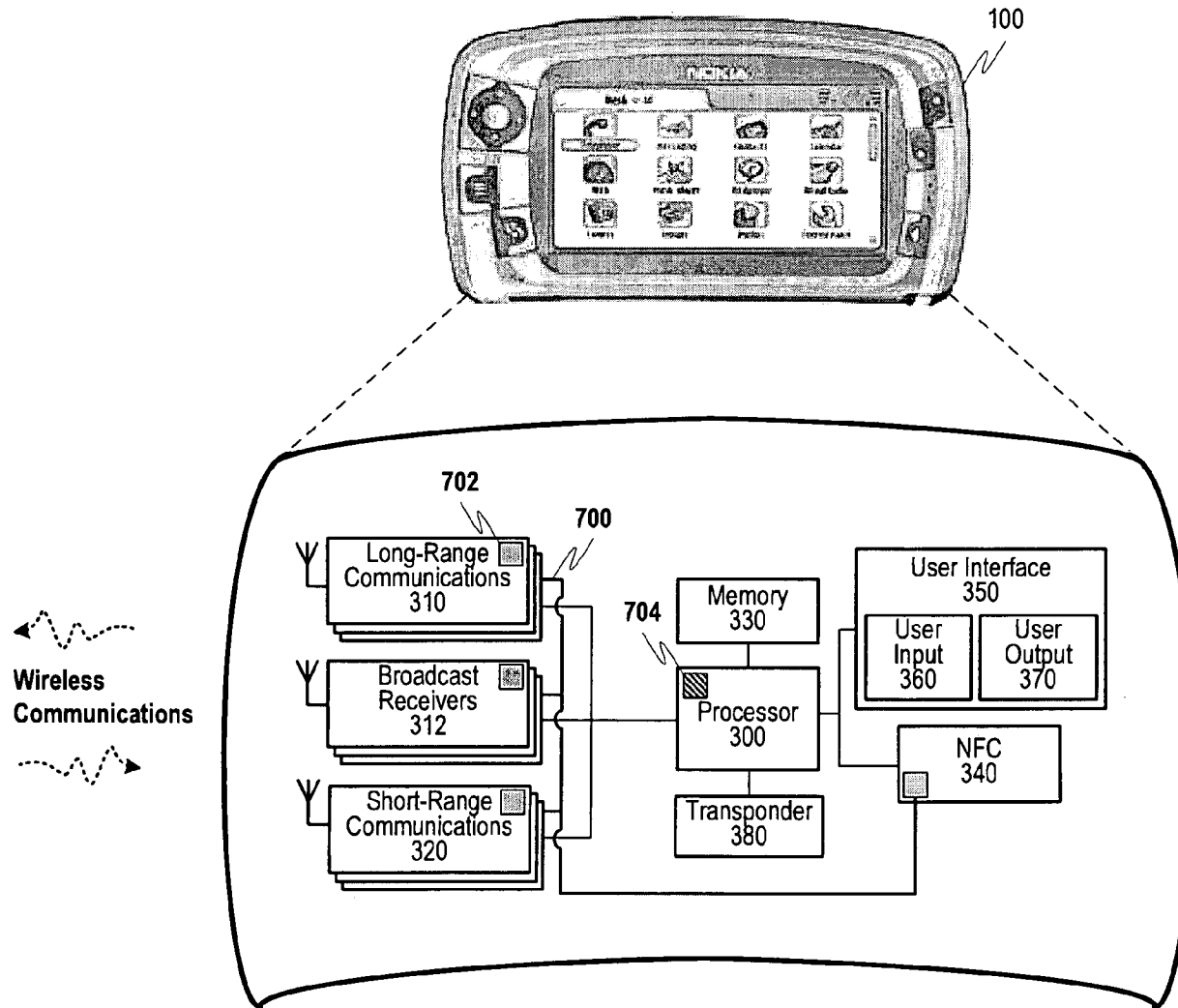


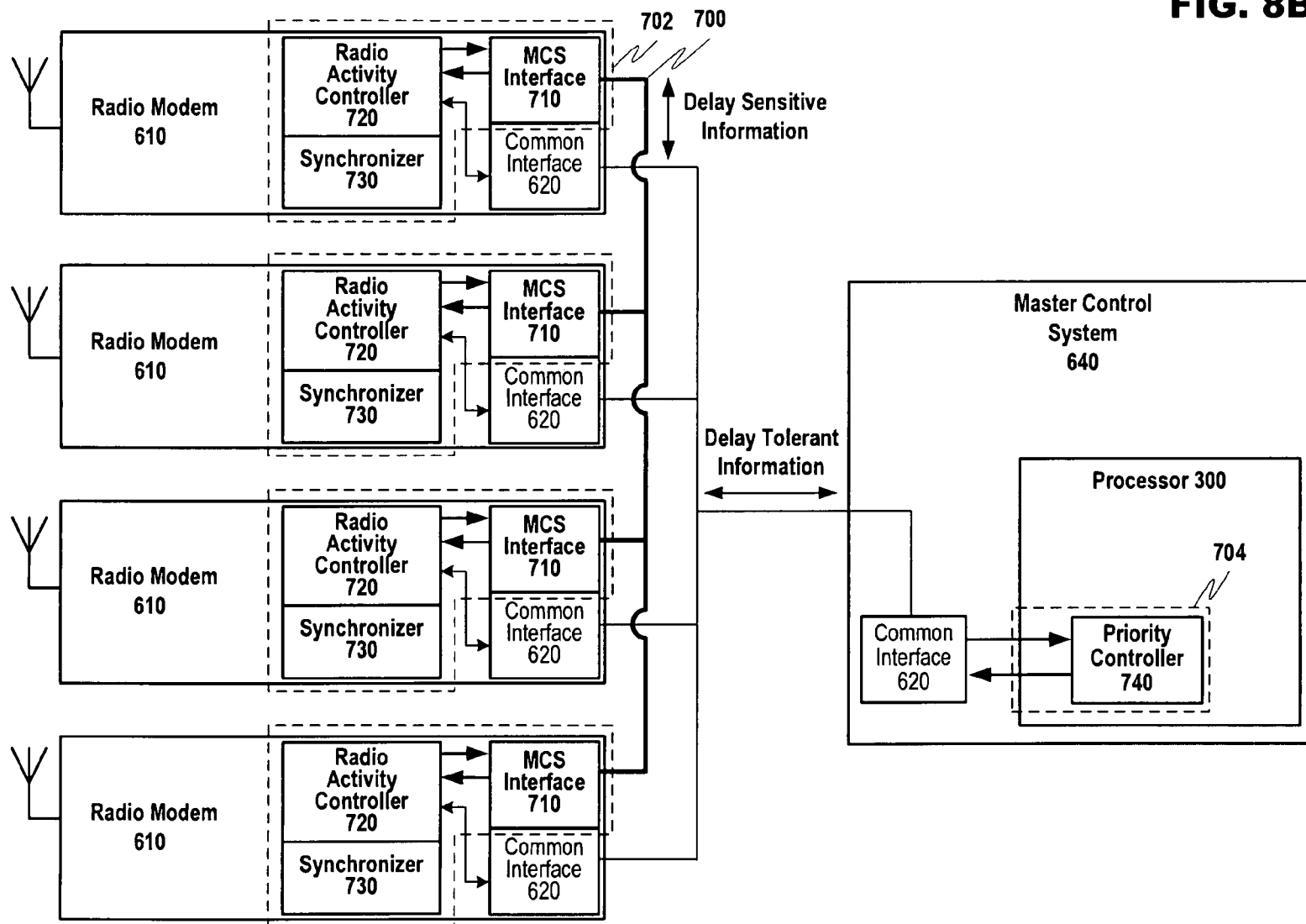


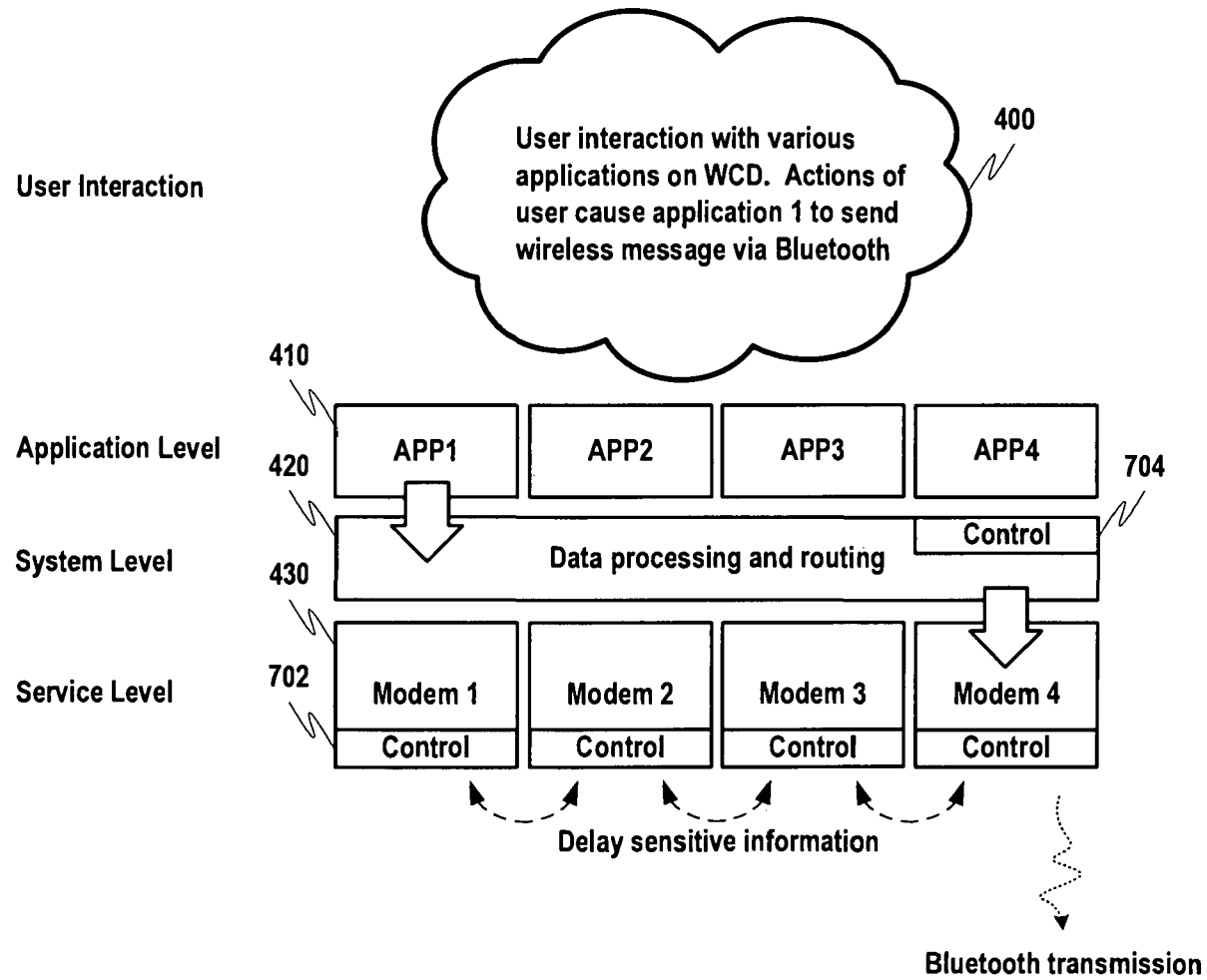


**FIG. 7C**

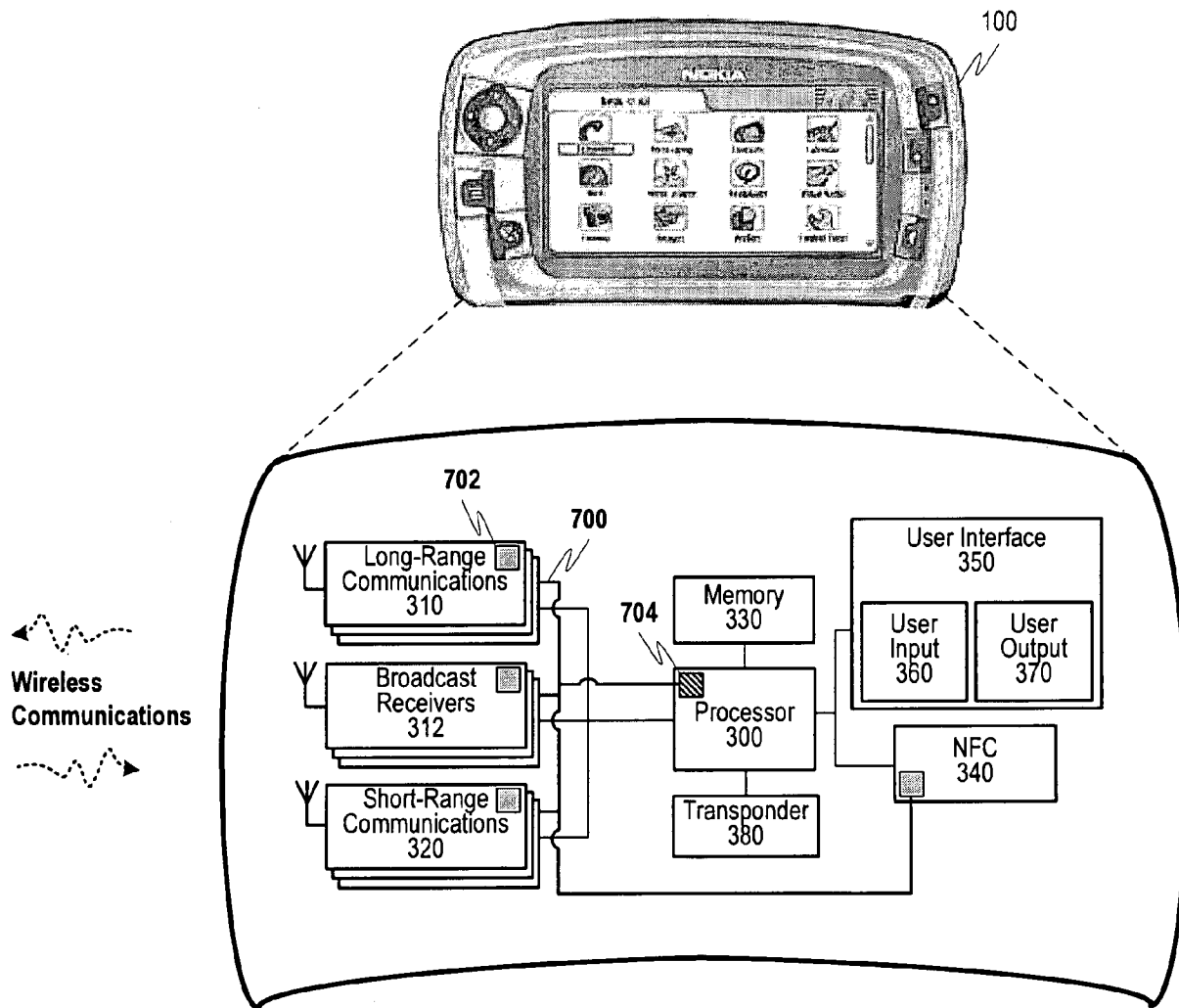
**FIG. 8A**

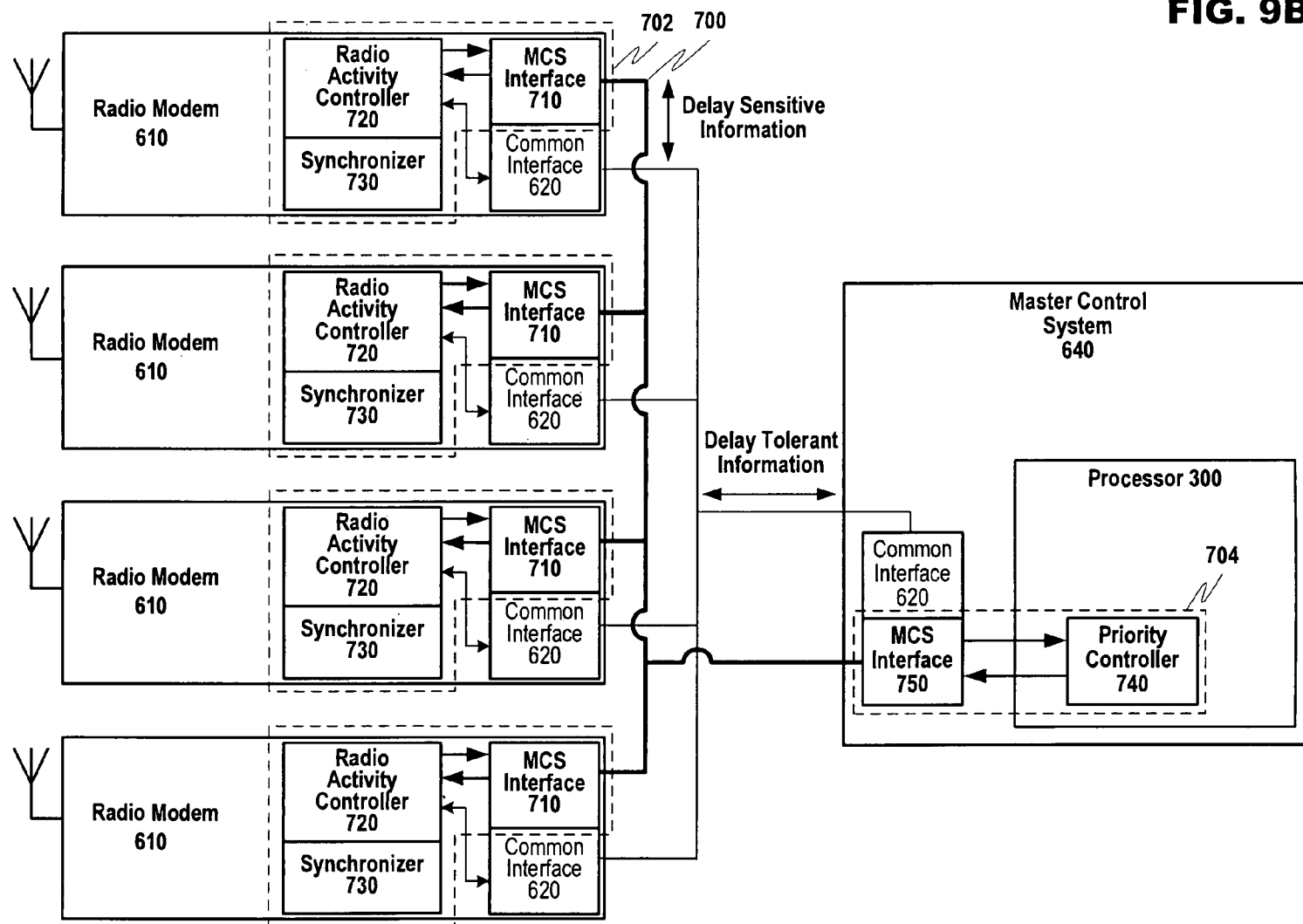


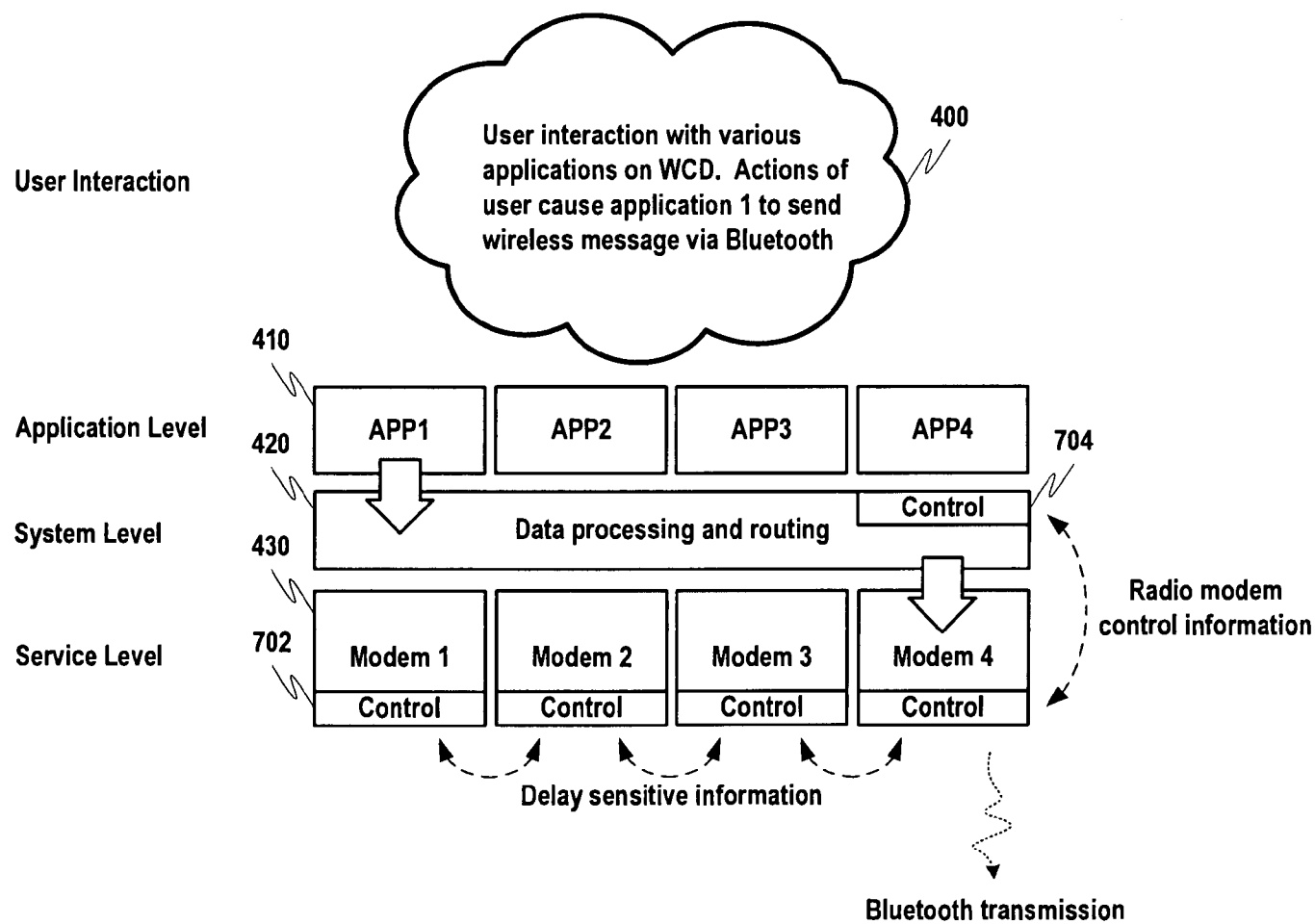
**FIG. 8B**

**FIG. 8C**

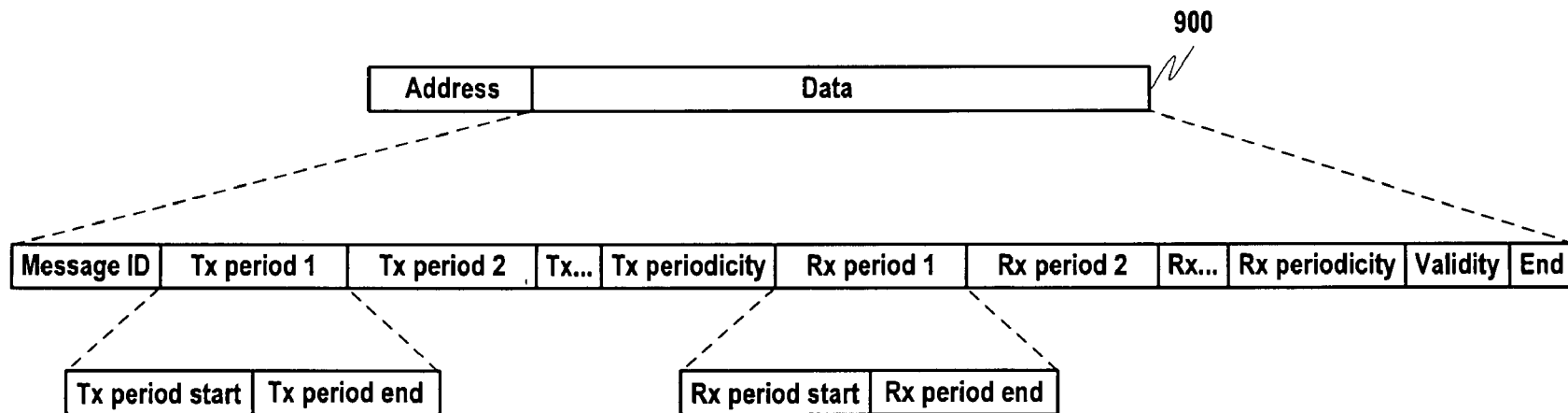
**FIG. 9A**





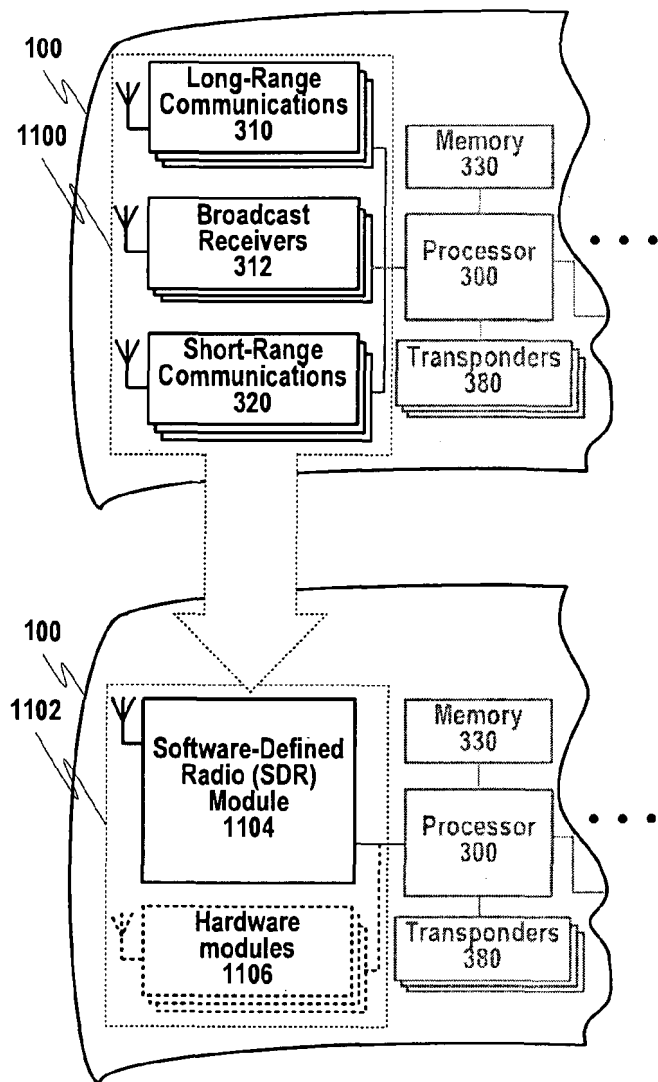
**FIG. 9C**

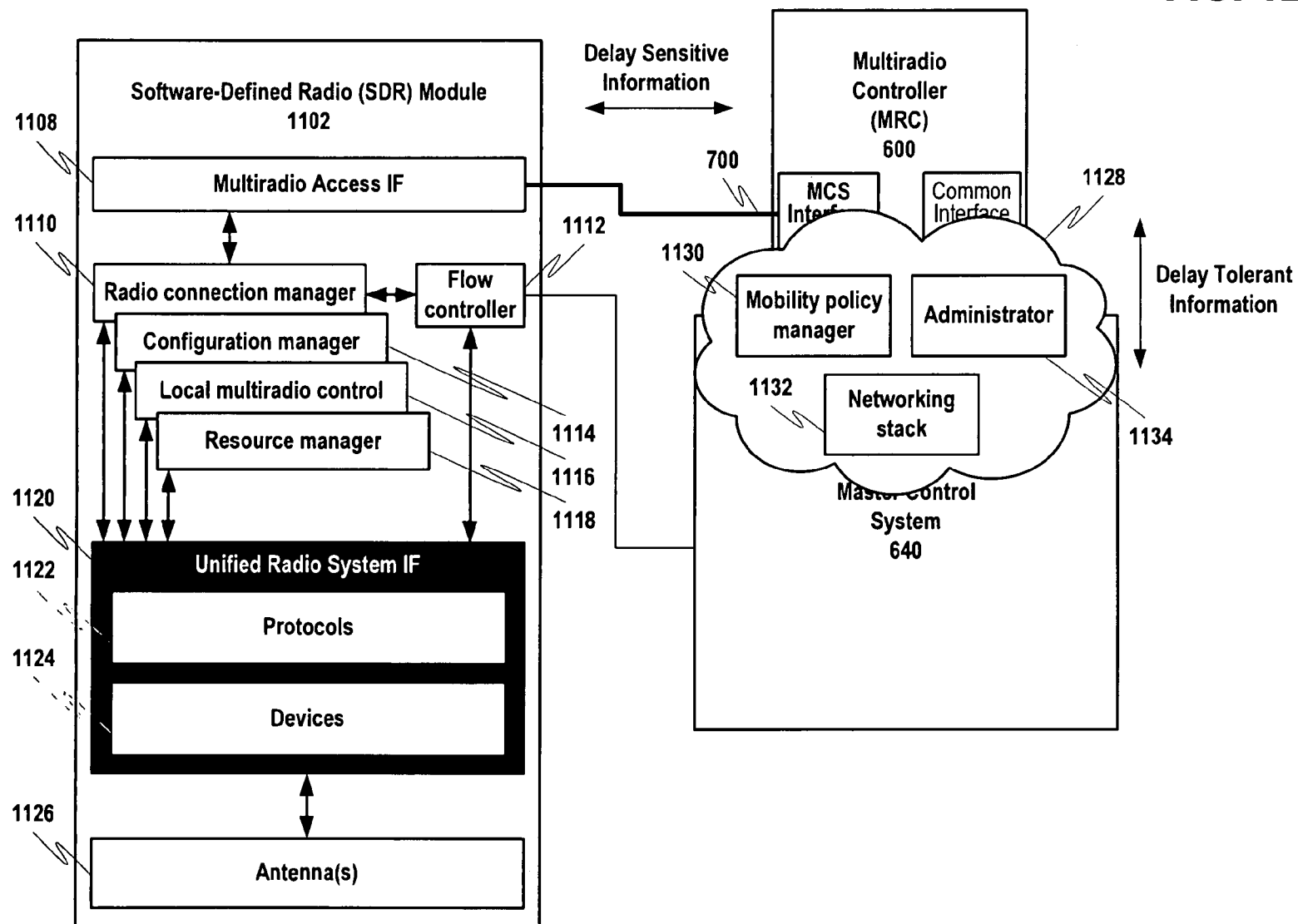
**FIG. 10**

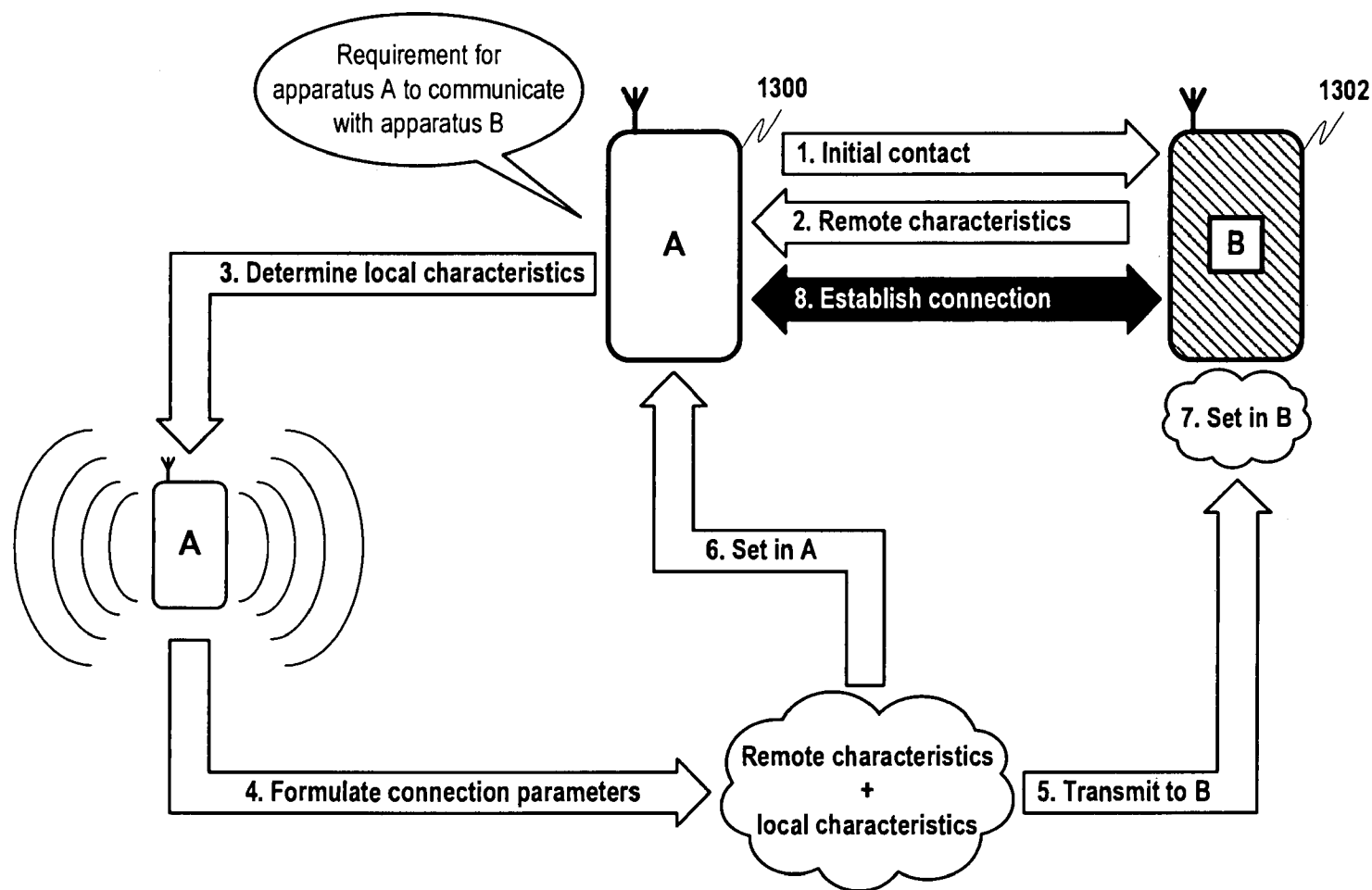


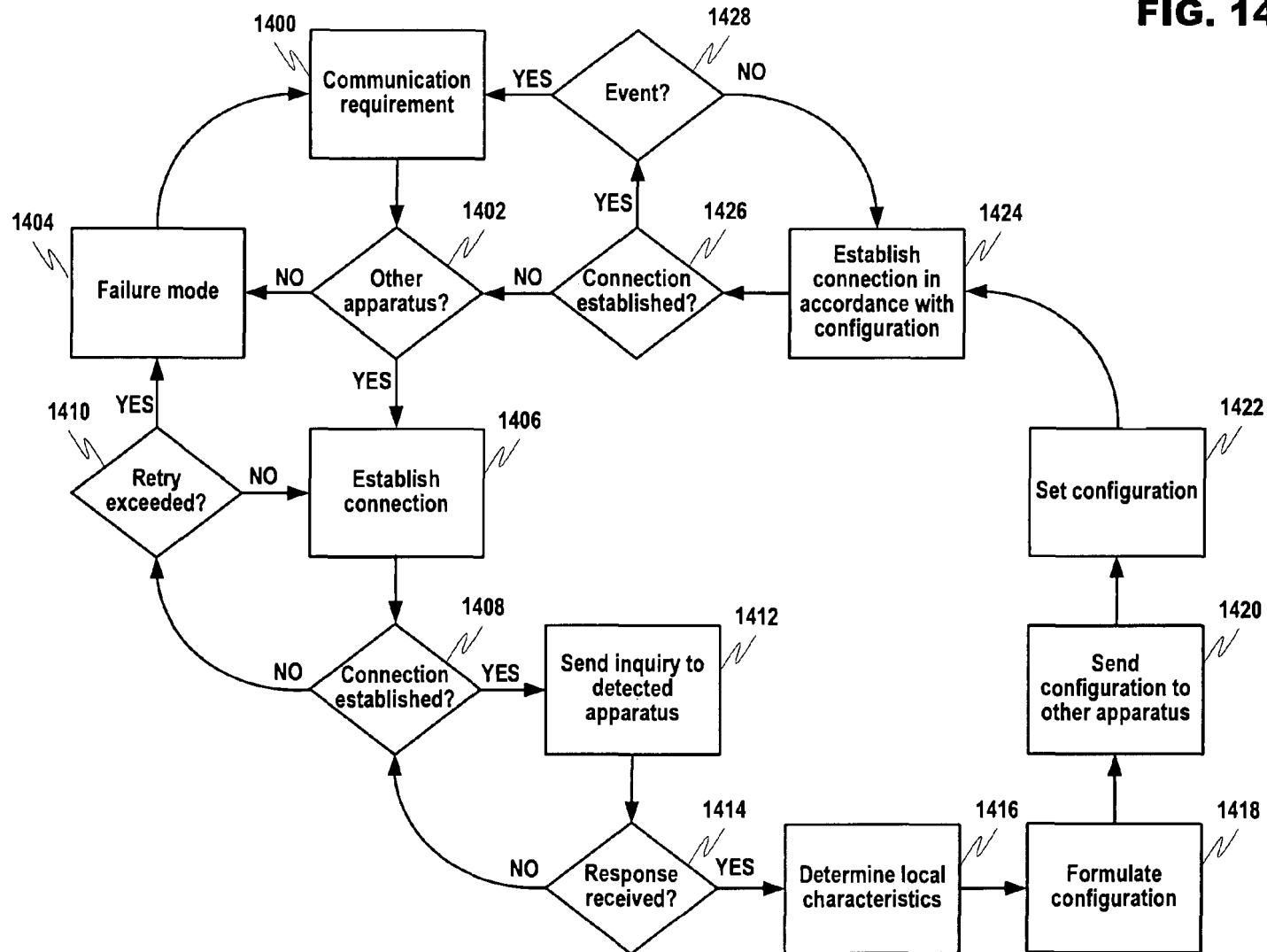


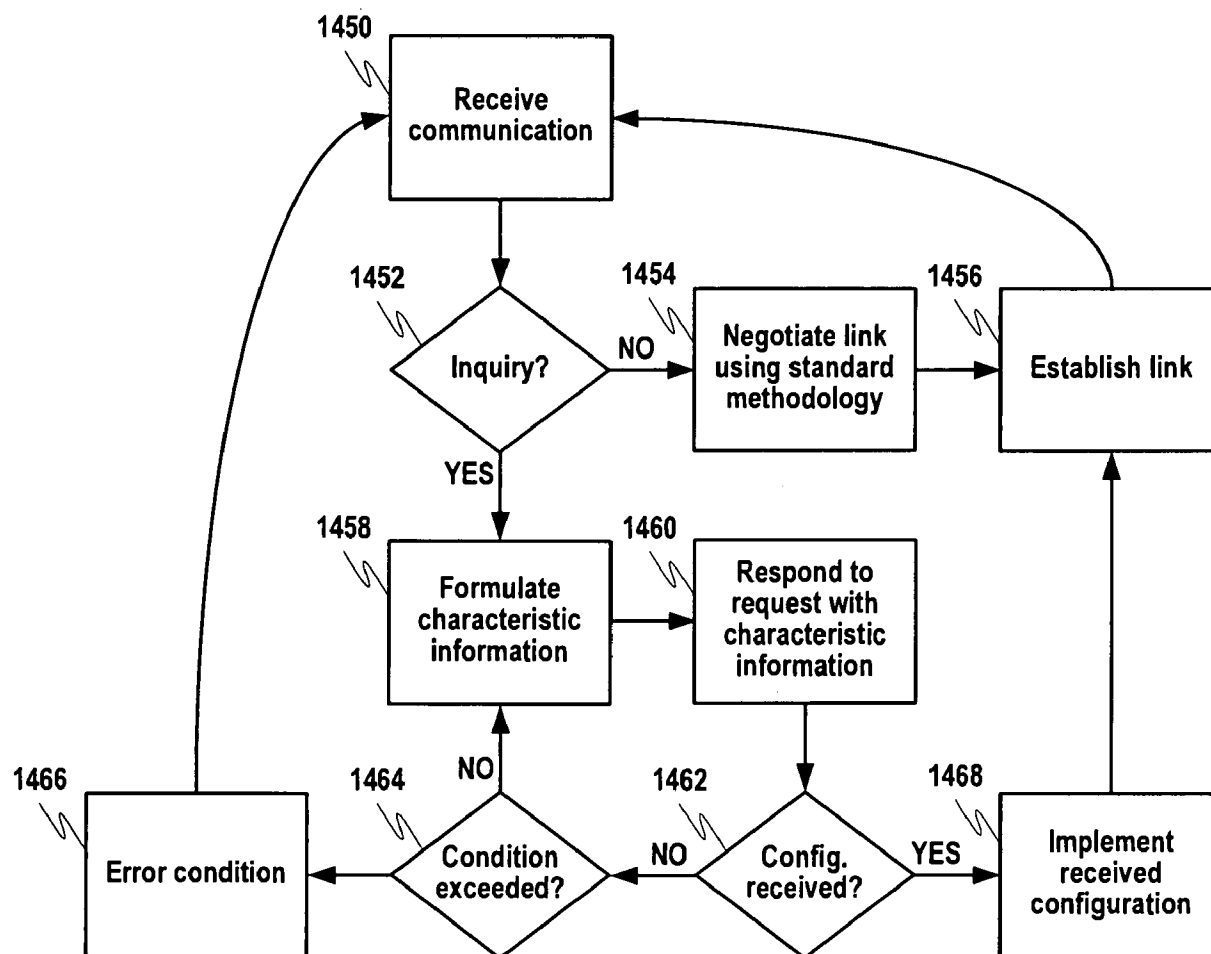
**FIG. 11**



**FIG. 12**

**FIG. 13**

**FIG. 14A**

**FIG. 14B**

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**SOFTWARE-DEFINED RADIO  
CONFIGURATION****BACKGROUND****1. Field of Invention**

The present invention relates to wireless communication, and more specifically, to a system for facilitating wireless communication connections between configurable radio devices.

**2. Background**

Wireless apparatuses continue to proliferate in the global marketplace due to technological improvement in both the quality of communication and device functionality. These wireless communication devices (WCDs) have become common for both personal and business use, allowing users to transmit and receive voice, text and graphical data from a multitude of geographic locations. Communication networks usable by these devices may span different frequencies and transmission distances.

For example, cellular networks may facilitate WCD communication over large geographic areas. These technologies are commonly divided by generation, starting in the 1970s-1980s with first generation (1G) analog cellular telephones that provided baseline voice communication, to modern digital handsets. GSM is an example of a widely employed 2G digital cellular network communicating in the 900 MHz/1.8 GHz bands in Europe and at 850 MHz and 1.9 GHz in the United States. GSM provides voice communication and supports text transmission via the Short Messaging Service (SMS). SMS may transmit and receive text messages of up to 160 characters, while providing data transfer to packet networks, ISDN and POTS users at 9.6 Kbps, while Multimedia Messaging Service (MMS) allows for the transmission of sound, graphics and video files in addition to simple text. Emerging technologies such as Digital Video Broadcasting for Handheld Devices (DVB-H) will make streaming digital video, and other similar content, available for direct transmission to a WCD. While long-range communication networks are a well-accepted means for transmitting and receiving data, due to cost, traffic and legislative concerns, these networks may not be appropriate for all data applications.

Short-range wireless networks may provide communication solutions that avoid some of the problems seen in large cellular networks. Bluetooth™ is an example of a short-range wireless technology quickly gaining acceptance in the marketplace. A 1 Mbps Bluetooth™ radio may transmit and receives data at a rate of 720 Kbps within a range of 10 meters, and may transmit up to 100 meters with additional power boosting. Enhanced data rate (EDR) technology also available may enable maximum asymmetric data rates of 1448 Kbps for a 2 Mbps connection and 2178 Kbps for a 3 Mbps connection. A plurality of devices within operating range of each other may automatically form a network group called a "piconet". Any apparatus may promote itself to the master of the piconet, allowing it to control data exchanges with up to seven "active" slaves and 255 "parked" slaves. Active slaves may exchange data based on the clock timing of the master, while parked slaves monitor a beacon signal in order to stay synchronized with the master. These apparatuses may continually switch between active communication and power saving modes in order to transmit data to other piconet members. In addition to Bluetooth™ other popular short-range wireless networks include WLAN (of which "Wi-Fi" local access points communicating in accordance with the IEEE 802.11 standard, is an example), WUSB, UWB, ZigBee (802.15.4, 802.15.4a), and UHF RFID.

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Manufacturers may also incorporate resources for providing enhanced functionality in WCDs (e.g., components and/or software for performing close-proximity wireless communication). Sensors, scanners, etc. may be utilized to read visual or electronic information into an apparatus. In an example transaction, users may hold their WCD in proximity to a target, aiming their WCD at an object (e.g., to take a picture) or sweeping the device over a printed tag or document to obtain information. These technologies include machine-readable mediums such as radio frequency identification (RFID), Infra-red (IR) communication, optical character recognition (OCR) and various other types of visual, electronic and magnetic scanning that may be utilized to quickly input desired information into the WCD without the need for manual entry by a user.

These examples of additional communication functionality may be implemented in apparatuses utilizing various combinations of hardware and/or software. For instance, one or more functions that were previously handled by discrete components (e.g., hardware-based wireless radios) may be handled by more generic software-driven processes. Moreover, the ability to reconfigure software-based modules during runtime may, in some instances, allow a software-based solution to emulate the functionality of multiple traditional hardware modules. The ability to implement flexible configuration may allow one or more hardware components to be omitted from an apparatus in favor of a software-based solution that is configurable to perform the same or similar function, while being more efficient in terms of power, space, etc.

However, problems can also spawn from the ability to reconfigure software-based modules during runtime. The runtime flexibility of software-driven solutions, while beneficial, can also increase the potential for negatively impacting (e.g., interfering with) other processes also occurring on the executing apparatus, on another apparatus with which communication is desired, etc. Further, software-based solutions must be able to interact with older discrete implementations by accounting for the limitations inherent in these hardware-based solutions.

**SUMMARY**

Various embodiments of the present invention are directed to at least a method, computer program product, apparatus and system for configuring communication resources that are at least partially based upon reconfigurable software modules. For example, an apparatus may utilize a plurality of transports for communication, wherein the transports are supported by one or more radio modules. The one or more radio modules may comprise hardware-based radio modules and software-defined radio (SDR) modules including a reconfigurable software element that allows the radio module to emulate the functionality of multiple hardware-based radios. In accordance with at least one embodiment of the present invention, SDR modules in an apparatus may formulate a communication configuration for use in communicating with another apparatus based on remote characteristic information (e.g., information corresponding to the apparatus with which communication is desired) and local characteristic information pertaining to the apparatus.

In an example implementation, an apparatus may desire to communicate with another apparatus. In order to configuration, the apparatus may first make an inquiry to the other device utilizing a initialization channel. Initialization channels may be, for example, predefined channels in a wireless transport that are reserved for communication establishment. The inquiry, if successfully received in the other apparatus,

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may prompt a response message to the inquiring apparatus, the response message including at least remote characteristic information.

Remote characteristic information may include, for example, information related to the abilities and/or status of the other apparatus, and may further incorporate environmental information concerning possible interference known to (e.g., in the case other transports that are currently being utilized), or sensed by, the other apparatus. A determination may also be made with respect to local characteristic information, wherein local characteristic information may be similar to the remote characteristic information but pertaining instead to the initiating apparatus.

The initiating apparatus may then formulate a configuration based at least upon the received remote characteristic information and the local characteristic information. In at least one embodiment of the present invention, the configuration may comprise information usable by resources in one or both of the initiating apparatus and the other apparatus for establishing a link between the apparatuses. The configuration may then be sent from the initiating apparatus to the other apparatus (e.g., via the initialization channel), wherein the configuration may be utilized for resource configuration. Similarly, the configuration information already residing on the initiating apparatus may also be utilized for configuring resources. The resulting resource configuration in each apparatus allows for the establishment of communication between the apparatuses, wherein the communication takes into account the condition of each apparatus.

The foregoing summary includes example embodiments of the present invention that are not intended to be limiting. The above embodiments are used merely to explain selected aspects or steps that may be utilized in implementations of the present invention. However, it is readily apparent that one or more aspects, or steps, pertaining to an example embodiment can be combined with one or more aspects, or steps, of other embodiments to create new embodiments still within the scope of the present invention. Therefore, persons of ordinary skill in the art would appreciate that various embodiments of the present invention may incorporate aspects from other embodiments, or may be implemented in combination with other embodiments.

## DESCRIPTION OF DRAWINGS

Various embodiments of the present invention may be understood in view of the following configuration examples taken in conjunction with the drawings, wherein:

FIG. 1 discloses an example of a wireless operational environment, including wireless transports having different effective ranges.

FIG. 2 discloses a modular example of a wireless communication device that may be usable in accordance with at least one embodiment of the present invention.

FIG. 3 discloses a structural representation of the example previously described with respect to FIG. 2.

FIG. 4 discloses an operational example of communication utilizing a wireless transport in accordance with at least one embodiment of the present invention.

FIG. 5 discloses an operational example wherein interference may occur during the concurrent operation of multiple radio modems within the same apparatus.

FIG. 6A discloses a structural example of a wireless communication device including a multiradio controller in accordance with at least one embodiment of the present invention.

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FIG. 6B discloses a more detailed structural representation of FIG. 6A including the multiradio controller and the radio modems.

FIG. 6C discloses an operational example of a wireless communication device including a multiradio controller in accordance with at least one embodiment of the present invention.

FIG. 7A discloses a structural example of a wireless communication device including a multiradio control system in accordance with at least one embodiment of the present invention.

FIG. 7B discloses a more detailed structural representation of FIG. 7A including the multiradio control system and the radio modems.

FIG. 7C discloses an operational example of a wireless communication device including a multiradio control system in accordance with at least one embodiment of the present invention.

FIG. 8A discloses a structural example of a wireless communication device including a distributed multiradio control system in accordance with at least one embodiment of the present invention.

FIG. 8B discloses a more detailed structural representation of FIG. 8A including the distributed multiradio control system and the radio modems.

FIG. 8C discloses an operational example of a wireless communication device including a distributed multiradio control system in accordance with at least one embodiment of the present invention.

FIG. 9A discloses a structural example of a wireless communication device including a distributed multiradio control system in accordance with an alternative embodiment of the present invention.

FIG. 9B discloses a more detailed structural representation of FIG. 9A including the distributed multiradio control system and the radio modems.

FIG. 9C discloses an operational example of a wireless communication device including a distributed multiradio control system in accordance with the alternative embodiment of the present invention disclosed in FIG. 9A.

FIG. 10 discloses an example of an information packet usable with at least one embodiment of the present invention.

FIG. 11 discloses an example of a software-defined radio module usable in implementing various embodiments of the present invention.

FIG. 12 discloses an example modular representation of the software-defined radio module disclosed in FIG. 11.

FIG. 13 discloses an operational example in accordance with at least one embodiment of the present invention.

FIG. 14A discloses a flowchart for an example configuration process from the initiator side in accordance with at least one embodiment of the present invention.

FIG. 14B discloses a flowchart for an example configuration process from the receiving side in accordance with at least one embodiment of the present invention.

## DESCRIPTION OF EXAMPLE EMBODIMENTS

While the present invention has been described herein in terms of a variety of embodiment examples, changes can be made therein without departing from the spirit and scope of the invention, as set forth in the appended claims.

I. Wireless Communication Over Different Communication Networks

Wireless communication devices may transmit and receive information over a wide array of wireless communication networks, each with different advantages regarding speed,



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range, quality (error correction), security (encoding), etc. These characteristics may dictate, for example, the amount of information that can be transferred to a receiving apparatus, and the duration of the information transfer. FIG. 1 includes an example of a WCD and how it may interact with various types of wireless networks.

In FIG. 1, user 110 possesses WCD 100. The apparatus shown is a high functionality portable device, however, usable apparatuses span a range from basic cellular handsets to more wirelessly enabled palmtop or laptop computers. Close-proximity communication 130 may include close proximity inter-apparatus communication or transponder-type interactions wherein only the scanning device may require a power source. In example transponder interaction, WCD 100 may scan source 120 via short-range communication. A transponder in source 120 may use the energy and/or clock signal contained within the scanning signal, as in the case of RFID communication, to respond with data stored in the transponder. Machine readable technologies may have an effective transmission range on the order of ten feet, and may be able to deliver stored data in amounts from a bit to over a megabit (or 125 Kbytes) relatively quickly. These characteristics make such technologies well suited for identification purposes, such as in receiving an account number for a public transportation provider, a key code for an automatic electronic door lock, an account number for a credit or debit transaction, etc.

The transmission range between two apparatuses may be extended if both device can participate in powered communication using more robust wireless transports. Short-range active communication 140 may include applications wherein the sending and receiving devices are both active. An example situation would include user 110 coming within effective transmission range of a Bluetooth™, WLAN, UWB, WUSB, etc. access point. In the case of Bluetooth™, a network may automatically be established to transmit information to WCD 100 possessed by user 110. The amount of information that can be conveyed is unlimited, except that it must all be transferred in the time when user 110 is within effective transmission range of the access point. The higher complexity attributed to these wireless transports means that additional time may be required when establishing an initial connection to WCD 100, which may be increased if a large number of devices are queued for service in the area proximate to the access point. The transmission range of these transports may vary depending on the technology and may, for example, extend from 30 ft. to over 300 ft. with additional power boosting.

Long-range networks 150 may be used to provide virtually uninterrupted communication coverage for WCD 100. Land-based radio stations or satellites may be used to relay various communication transactions worldwide. While these systems are extremely functional, the use of these systems is often charged on a per-minute basis to user 110, not including additional charges for data transfer (e.g., wireless Internet access). Further, the regulations covering these systems may cause additional overhead for both the users and providers, making the use of these systems more cumbersome.

## II. Wireless Communication Device

As previously described, various embodiments of the present invention may be implemented using a variety of wireless communication equipment. Therefore, it is important to understand the communication tools available to user 110 before exploring the present invention. For example, in the case of a cellular telephone or other handheld wireless devices, the integrated data handling capabilities of the device

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play an important role in facilitating transactions between the transmitting and receiving devices.

FIG. 2 discloses an example of a modular layout for an apparatus usable with the present invention. WCD 100 is broken down into modules representing the functional aspects of the device. These functions may be performed by the various combinations of software and/or hardware components discussed below.

Control module 210 may regulate the operation of the apparatus. Inputs may be received from various other modules included within WCD 100. For example, interference sensing module 220 may use various techniques to detect any sources of environmental interference within transmission range of the apparatus. Control module 210 may interpret this data, and in response, may control other modules in WCD 100.

Communications module 230 may incorporate all of the communication aspects of WCD 100. As shown in FIG. 2, communications module 230 may include, for example, long-range communications module 232, short-range communications module 234 and close-proximity module 236. Communications module 230 may utilize one or more of these sub-modules to receive a multitude of different types of communication from both local and long distance sources, and to transmit data to recipient devices within the transmission range of WCD 100. Communications module 230 may be triggered by control module 210, or by control resources local to the module responding to sensed messages, environmental influences and/or other devices in proximity to WCD 100.

User interface module 240 may comprise visual, audible and tactile components (e.g., hardware and/or software) that allow user 110 to receive data from, and enter data into, the device. For instance, data entered by user 110 may be interpreted by control module 210 to affect the behavior of WCD 100. User-inputted data may also be transmitted by communications module 230 to other devices within effective transmission range. Other devices in transmission range may also send information to WCD 100 via communications module 230, and control module 210 may cause this information to be transferred to user interface module 240 for presentation to the user.

Applications module 250 may comprise other hardware and/or software applications on WCD 100. These applications may include sensors, interfaces, utilities, interpreters, data applications, etc., and may be invoked by control module 210 to read information provided by the various modules, and in turn, may supply information to requesting modules in WCD 100.

In accordance with at least one embodiment of the present invention, FIG. 3 discloses an example of a structural layout usable in implementing the functionality of the modular system previously described with respect to FIG. 2. Processor 300 may control overall device operation. As shown in FIG. 3, processor 300 may be coupled to one or more communications sections 310, 320 and 340. Processor 300 may further be implemented utilizing one or more microprocessors that are each capable of executing software instructions stored in memory 330.

Memory 330 may include various types of random access memory (RAM), read only memory (ROM). Examples of usable memory types may include, for example, fixed computer readable media such electronic components and/or modules in stalled in the apparatus. Further, removable computer-readable medium on which computer executable code is embodied or recorded may be considered part of memory 330. Removable media may include electronic (e.g., Flash),



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magnetic (e.g., removable disks, drives, etc.), optical (e.g., CD-ROM, DVD, etc.) media, or any other technology that may be configured to store information in the form of data and software components (also referred to as modules). Data stored by memory 330 may be associated with particular software components. In addition, this data may be associated with databases, such as a bookmark database or a business database for scheduling, email, etc.

The software components stored by memory 330 include instructions that can be executed by processor 300. Various types of software components may be stored in memory 330. For instance, memory 330 may store software components that control the overall operation of WCD 100 (e.g., in the form of an operating system) and may also include more specialized software modules configured to manage particular functions such as communication sections 310, 320 and 340. Application-related software modules may also be stored in Memory 330. Examples of these software components may include a firewall, a service guide manager, a bookmark database, user interface manager, user-installed applications and communication utilities modules required to support WCD 100.

Long-range communications 310 may manage functionality related to the wireless exchange of information over large geographic areas (such as cellular networks) via an antenna. Communication transactions may be conducted using technologies from the previously described 1G to 3G. In addition to basic voice communication (e.g., via GSM), long-range communications 310 may operate to establish data communication sessions, such as General Packet Radio Service (GPRS) sessions and/or Universal Mobile Telecommunications System (UMTS) sessions. Also, long-range communications 310 may operate to transmit and receive messages, such as short messaging service (SMS) messages and/or multimedia messaging service (MMS) messages.

As a subset of long-range communications 310, or alternatively operating as an independent module separately connected to processor 300, transmission receiver 312 may allow WCD 100 to receive transmission messages via mediums such as Digital Video Broadcast for Handheld Devices (DVB-H). In at least one example scenario, transmissions may be encoded so that only certain receiving devices may access the transmission content, and may contain text, audio or video information. Further, WCD 100 may receive these transmissions and use information contained within the transmission signal to determine if the device is permitted to view the received content.

Short-range communications 320 is responsible for functions involving the exchange of information across short-range wireless networks. As described above and in FIG. 3, examples of wireless transports that may be categorized under short-range communications 320 are not limited to Bluetooth™, WLAN, UWB Ultra-Low Power Bluetooth™ (ULP-BT), wireless USB, Zigbee and Ultra High Frequency Radio Frequency communication (UHF RFID). Accordingly, short-range communications 320 performs functions related to the establishment of short-range connections, as well as processing related to the transmission and reception of information via such connections.

Close-proximity communications 340 may provide functionality related to the short-range scanning of machine-readable data. Near Field Communication, or NFC, apparatuses may be included in this category. For example, processor 300 may control components in close-proximity communication 340 to generate RF signals for activating an RFID transponder, and may in turn control the reception of signals from an RFID transponder. Other short-range scanning methods for

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reading machine-readable data that may be supported by the close-proximity 340 are not limited to IR communication, linear and 2-D (e.g., QR) bar code readers (including processes related to interpreting UPC labels), and optical character recognition devices for reading magnetic, UV, conductive or other types of coded data that may be provided in a tag using suitable ink. To support the scanning of machine-readable data by close-proximity communications 340, WCD 100 may, for example, incorporate components such as optical detectors, magnetic detectors, CCDs or other sensors known in the art for interpreting machine-readable information.

As further shown in FIG. 3, user interface 350 may also be coupled to processor 300. User interface 350 facilitates the exchange of information with a user. The example of FIG. 3 discloses a user interface 350 that includes a user input 360 and a user output 370. User input 360 may include one or more components that allow user 110 to input information. Examples of such components include keypads, touch screens, and microphones. User output 370 allows a user to receive information from the device. Thus, user output portion 370 may include various components, such as a display, light emitting diodes (LED), tactile emitters and one or more audio speakers. Example displays include liquid crystal displays (LCDs), and other video displays.

WCD 100 may further include one or more transponders 380. A transponder may essentially comprise a passive device that may be programmed by processor 300 with information to be delivered in response to a scan from an outside source. For example, an RFID scanner mounted in an entryway may continuously emit radio frequency waves. When a person with a device containing transponder 380 walks through the door, the transponder may be energized, causing it to respond with information identifying the device, the person, etc. In addition, scanners can be mounted (e.g., as previously discussed with regard to examples of close-proximity communications 340) in WCD 100 so that it can read information from other transponders in the vicinity.

Hardware corresponding to communications sections 310, 312, 320 and 340 provide for the transmission and reception of signals. Accordingly, these portions may include components (e.g., electronics) that perform functions, such as modulation, demodulation, amplification, and filtering. These portions may be locally controlled, or controlled by processor 300 in accordance with software communication components stored in memory 330. The elements of FIG. 3 may further be constituted and/or coupled in accordance with various techniques in order to produce the functionality described in FIG. 2. In one example configuration, processor 300, communications sections 310, 312 and 320, memory 330, close-proximity communications 340, user interface 350, transponder 380, etc. may comprise separate components that are coupled together via one or more wired and/or wireless bus interfaces. Alternatively, any or all individual components may be replaced by integrated circuits in the form of a programmable logic device, gate array, ASIC, multi-chip module, etc. that may be programmed to replicate the functions of the stand-alone devices. In addition, each of these components may be coupled to a power source, such as a removable and/or rechargeable battery (not shown).

User interface 350 may allow user 110 to interact with various software components installed on the apparatus (e.g., contained in memory 330). The software components may, for example, provide functionality such as operating system modules, applications for productivity, entertainment, etc., communication utilities for supporting long-range communications 310, short-range communications 320, close-proximity communications 340, etc. Software components may

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include routines that, for example, may be configured to provide data processing, routing, transmission, reception, etc. Various programming mediums/languages may be used (Wireless Application (WAP), Hypertext Markup Language (HTML) variants like Compact HTML (CHTML), etc.)

### III. Example Operation of a Wireless Communication Device Including Potential Interference Problems Encountered.

FIG. 4 discloses an example of a process stack, in accordance with at least one embodiment of the present invention, for use in explaining operation of an apparatus. At the top level 400, user 110 interacts with WCD 100. This example involves user 110 entering information via user input 360 and receiving information from user output 370 in order to activate functionality in application level 410. In the application level, programs related to specific functionality within the device interact with both the user and the system level. These programs include applications for visual information (e.g., web browser, DVB-H receiver, etc.), audio information (e.g., cellular telephone, voice mail, conferencing software, DAB or analog radio receiver, etc.), recording information (e.g., digital photography software, word processing, scheduling, etc.) or other information processing. Actions initiated in application level 410 may require information to be sent from, or received into, WCD 100. In FIG. 4, the transmission of data to a recipient apparatus via Bluetooth™ is being requested. As a result, application level 410 may then call resources in the system level to initiate the required processing and routing of data.

System level 420 may process and route data requests for transmission. Processing may include, for example, the calculation, translation, conversion and/or packetizing the data. The data may then be routed to an appropriate communication resource in the service level. If the desired communication resource is active and available in the service level 430, the packets may be routed to a radio modem for delivery via wireless transmission. In some configurations radio modems may comprise support hardware and/or software in addition to the actual modem component, and therefore, radio modems may interchangeably be referred to as radio modules herein. Apparatuses usable in implementing various embodiments of the present invention may include a plurality of these radio modules that are configured to operate using different wireless mediums. In FIG. 4, “modem 4” may be activated and able to send packets using Bluetooth™ communication. However, a radio module (as a hardware resource) need not be dedicated to a specific wireless medium, and may be used for different types of communication depending on the requirements of the wireless transport and the hardware characteristics of the radio modem or module.

FIG. 5 discloses a situation wherein the above described example operational process may cause more than one radio modem to become active. In this example, WCD 100 may both transmit and receive information via a multitude of transports in order to interact with various secondary devices such as those grouped at 500. For example, secondary devices may include cellular handsets communicating via long-range wireless communication like GSM, wireless headsets communicating via Bluetooth™, Internet access points communicating via WLAN, etc.

Problems may occur when some or all of these communications occur simultaneously. As further shown in FIG. 5, multiple modems operating simultaneously may cause interference for each other. Such a situation may be encountered when WCD 100 is communicating with more than one external device (as previously described). In an extreme example, devices simultaneously communicating via Bluetooth™, WLAN and wireless USB would encounter substantial over-

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lap since all of these wireless transports operate in the 2.4 GHz band. The interference, shown as an overlapping portion of the fields depicted in FIG. 5, would cause packets to be lost and the need for retransmission of these lost packets. Retransmission requires that future time slots be used to retransmit lost information, and therefore, overall communication performance will at least be reduced, if the signal is not lost completely. The present invention, in accordance with at least one embodiment, seeks to manage problematic situations where possibly conflicting communications may occur simultaneously so that interference is minimized or avoided, resulting in increased speed and Quality of Service (QoS).

### IV. A Wireless Communication Device Including a Multiradio Controller

In an attempt to better manage communication in WCD 100, a controller dedicated to managing wireless communication may be introduced. WCD 100, as shown in FIG. 6A, includes a multiradio controller (MRC) 600 in accordance with at least one embodiment of the present invention. MRC 600 may be coupled to the master control system of WCD 100, enabling MRC 600 to communicate with radio modems or other similar devices in communications modules 310 312, 320 and 340 within WCD 100.

FIG. 6B discloses in detail at least one embodiment of WCD 100, which may include multiradio controller (MRC) 600 introduced in FIG. 6A in accordance with at least one embodiment of the present invention. MRC 600 includes common interface 620 by which information may be sent or received through master control system 640. As set forth above, radio modems 610 and other devices 630 may also be referred to as “modules” in this disclosure as they may contain supporting hardware and/or software resources in addition to the modem itself. These resources may include control, interface and/or processing resources. Radio modems 610 or similar communication devices 630 (e.g., an RFID scanner for scanning machine-readable information) may include some sort of common interface 620 for communicating with master control system 640. As a result, all information, commands, etc. occurring between radio modems 610, similar devices 630 and MRC 600 are conveyed by the communication resources of master control system 640. The possible effect of sharing communication resources with all the other functional modules within WCD 100 will be discussed with respect to FIG. 6C.

FIG. 6C discloses an operational diagram similar to FIG. 4 including the effect of MRC 600 in accordance with at least one embodiment of the present invention. In this system MRC 600 may receive operational data from the master operating system of WCD 100, concerning for example applications running in application level 410, and status data from the various radio communication devices in service level 430. MRC 600 may use this information to issue scheduling commands to the communication devices in service level 430 in an attempt to avoid communication problems. However, problems may occur when the operations of WCD 100 are fully employed. Since the various applications in application level 410, the operating system in system level 420, the communication devices in service level 430 and MRC 600 must all share the same communication system, delays may occur when all aspects of WCD 100 are trying to communicate on the common interface system 620. As a result, delay sensitive information regarding both communication resource status information and radio modem 610 control information may become delayed, nullifying any beneficial effect from MRC 600. Therefore, a system better able to handle the differentiation and routing of delay sensitive information is required if the beneficial effect of MRC 600 is to be realized.

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V. A Wireless Communication Device Including a Multiradio Control System.

In accordance with at least one embodiment of the present invention, FIG. 7A introduces MRC 600 as part of multiradio control system (MCS) 700. MCS 700 may directly link communication resources in modules 310, 312, 320 and 340 to MRC 600. In this way, MCS 700 may be configured to provide a dedicated low-traffic communication structure for carrying delay sensitive information both to and from MRC 600.

Additional detail is shown in FIG. 7B. MCS 700 forms a direct link between MRC 600 and the communication resources of WCD 100. This link may be established by a system of dedicated MCS interfaces 710 and 760. For example, MCS interface 760 may be coupled to MRC 600. MCS Interfaces 710 may connect radio modems 610 and other similar communication devices 630 to MCS 700 in order to form an information conveyance for allowing delay sensitive information to travel to and from MRC 600. Therefore, MRC 600 operation may no longer be influenced by the processing load of master control system 640. As a result, any information still communicated by master control system 640 to and from MRC 600 may be deemed delay tolerant, and therefore, the actual arrival time of this information does not substantially influence system performance. On the other hand, all delay sensitive information is directed to MCS 700, and therefore is insulated from the loading of the master control system.

The effect of MCS 700 is seen in FIG. 7C in accordance with at least one embodiment of the present invention. Information may now be received in MRC 600 from at least two sources. System level 420 may continue to provide information to MRC 600 through master control system 640. In addition, service level 430 may specifically provide delay sensitive information conveyed by MCS 700. MRC 600 may distinguish between these two classes of information and act accordingly. Delay tolerant information may include information that typically does not change when a radio modem is actively engaged in communication, such as radio mode information (e.g., GPRS, Bluetooth™, WLAN, etc.), priority information that may be defined by user settings, the specific service the radio is driving (QoS, real time/non real time), etc. Since delay tolerant information changes infrequently, it may be delivered in due course by master control system 640 of WCD 100. Alternatively, delay sensitive (or time sensitive) information includes at least modem operational information that frequently changes during the course of a wireless connection, and therefore, requires immediate update. As a result, delay sensitive information may need to be delivered directly from the plurality of radio modems 610 through the MCS interfaces 710 and 760 to MRC 600, and may include radio modem synchronization information. Delay sensitive information may be provided in response to requests by MRC 600, or may be delivered as a result of a change in radio modem settings during transmission as discussed below with respect to synchronization.

VI. A Wireless Communication Device Including a Distributed Multiradio Control System.

FIG. 8A discloses an alternative configuration in accordance with at least one embodiment of the present invention, wherein a distributed multiradio control system (MCS) 700 is introduced into WCD 100. Distributed MCS 700 may, in some cases, be deemed to provide an advantage over a centralized MRC 600 by distributing these control features into already necessary components within WCD 100. As a result, a substantial amount of the communication management operations may be localized to the various communication

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resources, such as radio modems (modules) 610, reducing the overall amount of control command traffic in WCD 100.

MCS 700, in this example, may be implemented utilizing a variety of bus structures, including the I<sup>2</sup>C interface commonly found in portable electronic devices, as well as emerging standards such as SLIMbus that are now under development. I<sup>2</sup>C is a multi-master bus, wherein multiple devices can be connected to the same bus and each one can act as a master through initiating a data transfer. An I<sup>2</sup>C bus contains at least two communication lines, an information line and a clock line. When an apparatus has data to transmit, it assumes a master role and transmits both its clock signal and information to a recipient device. On the other hand, SLIMbus uses a separate, non-differential physical layer that runs at rates of 50 Mbits/s or slower over just one lane. It is being developed by the Mobile Industry Processor Interface (MIPI) Alliance to replace today's I<sup>2</sup>C and I<sup>2</sup>S interfaces while offering more features and requiring the same or less power than the two combined.

MCS 700 directly links distributed control components 702 in modules 310, 312, 320 and 340. Another distributed control component 704 may reside in master control system 640 of WCD 100. It is important to note that distributed control component 704 shown in processor 300 is not limited only to the disclosed embodiment, and may reside in any appropriate system module within WCD 100. The addition of MCS 700 provides a dedicated low-traffic communication structure for carrying delay sensitive information both to and from the various distributed control components 702.

The example configuration disclosed in FIG. 8A is described further with respect to FIG. 8B. MCS 700 forms a direct link between distributed control components 702 within WCD 100. Distributed control components 702 in radio modems 610 (together forming a "module") may, for example, consist of MCS interface 710, radio activity controller 720 and synchronizer 730. Radio activity controller 720 uses MCS interface 710 to communicate with distributed control components in other radio modems 610. Synchronizer 730 may be utilized to obtain timing information from radio modem 610 to satisfy synchronization requests from any of the distributed control components 702. Radio activity controller 702 may also obtain information from master control system 640 (e.g., from distributed control component 704) through common interface 620. As a result, any information communicated by master control system 640 to radio activity controller 720 through common interface 620 may be deemed delay tolerant, and therefore, the actual arrival time of this information does not substantially influence communication system performance. On the other hand, all delay sensitive information may be conveyed by MCS 700, and therefore is insulated from master control system overloading.

As previously stated, distributed control component 704 may exist within master control system 640. Some aspects of this component may reside in processor 300 as, for example, a running software routine that monitors and coordinates the behavior of radio activity controllers 720. Processor 300 is shown to contain priority controller 740. Priority controller 740 may be utilized to monitor active radio modems 610 in order to determine priority amongst these devices. Priority may be determined by rules and/or conditions stored in priority controller 740. Modems that become active may request priority information from priority controller 740. Further, modems that go inactive may notify priority controller 740 so that the relative priority of the remaining active radio modems 610 may be adjusted accordingly. Priority information is usually not considered delay sensitive because it is mainly



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updated when radio modems 610 activate/deactivate, and therefore, does not frequently change during the course of an active communication connection in radio modems 610. In various embodiments of the present invention, this information may be conveyed to radio modems 610 using common interface system 620.

At least one impact of a distributed control MCS 700 is seen in FIG. 8C. System level 420 may continue to provide delay tolerant information to distributed control components 702 through master control system 640. In addition, distributed control components 702 in service level 430, such as modem activity controllers 720, may exchange delay sensitive information with each other via MCS 700. Each distributed control component 702 may distinguish between these two classes of information and act accordingly. Delay tolerant information may include information that typically does not change when a radio modem is actively engaged in communication, such as radio mode information (e.g., GPRS, Bluetooth™, WLAN, etc.), priority information that may be defined by user settings, the specific service the radio is driving (QoS, real time/non real time), etc. Since delay tolerant information changes infrequently, it may be delivered in due course by master control system 640 of WCD 100. Alternatively, delay sensitive (or time sensitive) information may include at least modem operational information that frequently changes during the course of a wireless connection, and therefore, requires immediate update. Delay sensitive information needs to be delivered directly between distributed control components 702, and may include radio modem synchronization and activity control information. Delay sensitive information may be provided in response to a request, or may be delivered as a result of a change in radio modem, which will be discussed with respect to synchronization below.

MCS interface 710 may be used to (1) Exchange synchronization information, and (2) Transmit identification or prioritization information between various radio activity controllers 720. In addition, as previously stated, MCS interface 710 may be utilized for communicating the radio parameters that are delay sensitive from a controlling point of view. MCS interface 710 can be shared between different radio modems (multipoint) but it cannot be shared with any other functionality that could limit the usage of MCS interface 710 from a latency point of view.

The control signals sent on MCS 700 that may enable/disable a radio modem 610 should be based upon a modem's periodic events. Each radio activity controller 720 may obtain this information about a radio modem's periodic events from synchronizer 730. This kind of event can be, for example, frame clock event in GSM (4.615 ms), slot clock event in Bluetooth™ (625 us) or targeted beacon transmission time in WLAN (100 ms) or any multiple of these. A radio modem 610 may send its synchronization indications when (1) Any radio activity controller 720 requests it, (2) a radio modem internal time reference is changed (e.g. due to handover or handoff). The latency requirement for the synchronization signal is not critical as long as the delay is constant within a few microseconds. The fixed delays can be taken into account in the scheduling logic of radio activity controller 710.

For predictive wireless communication mediums, the radio modem activity control may be based on the knowledge of when the active radio modems 610 are about to transmit (or receive) in the specific connection mode in which the radios are currently operating. The connection mode of each radio modem 610 may be mapped to the time domain operation in their respective radio activity controller 720. As an example, for a GSM speech connection, priority controller 740 may

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have knowledge about all traffic patterns of GSM. This information may be transferred to the appropriate radio activity controller 720 when radio modem 610 becomes active, which may then recognize that the speech connection in GSM includes one transmission slot of length 577 μs, followed by an empty slot after which is the reception slot of 577 μs, two empty slots, monitoring (RX on), two empty slots, and then it repeats. Dual transfer mode means two transmission slots, empty slot, reception slot, empty slot, monitoring and two empty slots. When all traffic patterns that are known a priori by the radio activity controller 720, it only needs to know when the transmission slot occurs in time to gain knowledge of when the GSM radio modem is active. This information may be obtained by synchronizer 730. When the active radio modem 610 is about to transmit (or receive) it must check every time whether the modem activity control signal from its respective radio activity controller 720 permits the communication. Radio activity controller 720 is always either allowing or disabling the transmission of one full radio transmission block (e.g. GSM slot).

#### VII. An Example of an Alternative Distributed Multiradio Control System.

An alternative distributed control configuration, in accordance with at least one embodiment of the present invention, is disclosed in FIG. 9A-9C. In FIG. 9A, distributed control components 702 continue to be linked by MCS 700. However, now distributed control component 704 may also be directly coupled to distributed control components 702 via an MCS interface. As a result, distributed control component 704 may also utilize and benefit from MCS 700 for transactions involving the various communication components of WCD 100.

Referring now to FIG. 9B, the inclusion of distributed control component 704 onto MCS 700 is shown in more detail. Distributed control component 704 includes at least priority controller 740 coupled to MCS interface 750. MCS interface 750 may allow priority controller 740 to send information to, and receive information from, radio activity controllers 720 via a low-traffic connection dedicated to the coordination of communication resources in WCD 100. As previously stated, the information provided by priority controller 740 may not be deemed delay sensitive information, however, the provision of priority information to radio activity controllers 720 via MCS 700 may improve the overall communication efficiency of WCD 100. Performance may improve because quicker communication between distributed control components 702 and 704 may result in faster relative priority resolution in radio activity controllers 720. Further, common interface system 620 of WCD 100 may be relieved of having to accommodate communication traffic from distributed control component 704, reducing the overall communication load in master control system 640. Another benefit may be realized in communication control flexibility in WCD 100. New features may be introduced into priority controller 740 without worrying about whether the messaging between control components will be delay tolerant or sensitive because an MCS interface 710 is already available at this location.

FIG. 9C discloses possible operational effects on communication in WCD 100 in view of the enhancements implemented in the current alternative embodiment of the present invention. The addition of an alternative route for radio modem control information to flow between distributed control components 702 and 704 may both improve the communication management of radio activity controllers 720 and lessen the burden on master control system 640. In this embodiment, all distributed control components of MCS 700

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are linked by a dedicated control interface, which provides immunity to communication coordination control messaging in WCD 100 when the master control system 640 is experiencing elevated transactional demands.

An example message packet 900, in accordance with various embodiments of the present invention, is disclosed in FIG. 10. Message packet 900 may include, for example, activity pattern information that may be formulated by MRC 600 or radio activity controller 720. An example data payload of packet 900 may include at least Message ID information, allowed/disallowed transmission (Tx) period information, allowed/disallowed reception (Rx) period information, Tx Rx periodicity (how often the Tx Rx activities contained in the period information occur), and validity information describing when the activity pattern becomes valid and whether the new activity pattern is replacing or added to the existing one. The data payload of packet 900, as shown, may consist of multiple allowed/disallowed periods for transmission or reception (e.g., Tx period 1, 2 . . . ) each containing at least a period start time and a period end time during which radio modem 610 may either be permitted or prevented from executing a communication activity. While the distributed example of MCS 700 may allow radio modem control activity to be controlled real-time (e.g., more control messages with finer granularity), the ability to include multiple allowed/disallowed periods into a single message packet 900 may support radio activity controllers 720 in scheduling radio modem behavior for longer periods of time, which may result in a reduction in message traffic. Further, changes in radio modem 610 activity patterns may be amended using the validity information in each message packet 900.

The modem activity control signal (e.g., packet 900) may be formulated by MRC 600 or radio activity controller 720 and transmitted on MCS 700. The signal includes activity periods for Tx and Rx separately, and the periodicity of the activity for the radio modem 610. While the native radio modem clock is the controlling time domain (never overwritten), the time reference utilized in synchronizing the activity periods to current radio modem operation may be based on one of at least two standards. In a first example, a transmission period may start after a pre-defined amount of synchronization events have occurred in radio modem 610. Alternatively, all timing for MRC 600 or between distributed control components 702 may be standardized around the system clock for WCD 100. Advantages and disadvantages exist for both solutions. Using a defined number of modem synchronization events is beneficial because then all timing is closely aligned with the radio modem clock. However, this strategy may be more complicated to implement than basing timing on the system clock. On the other hand, while timing based on the system clock may be easier to implement as a standard, conversion to modem clock timing must necessarily be implemented whenever a new activity pattern is installed in radio modem 610.

The activity period may be indicated as start and stop times. If there is only one active connection, or if there is no need to schedule the active connections, the modem activity control signal may be set always on allowing the radio modems to operate without restriction. The radio modem 610 should check whether the transmission or reception is allowed before attempting actual communication. The activity end time can be used to check the synchronization. Once the radio modem 610 has ended the transaction (slot/packet/burst), it can check whether the activity signal is still set (it should be due to margins). If this is not the case, the radio modem 610 can initiate a new synchronization with MRC 600 or with radio activity controller 720 through synchronizer 730. The same

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thing may happen if a radio modem time reference or connection mode changes. A problem may occur if radio activity controller 720 runs out of the modem synchronization and starts to apply modem transmission/reception restrictions at the wrong time. Due to this, modem synchronization signals need to be updated periodically. The more active wireless connections, the more accuracy is required in synchronization information.

#### VIII. Radio Modem Interface to Other Devices.

As a part of information acquisition services, MCS interface 710 may need to send information to MRC 600 (or radio activity controllers 720) about periodic events of the radio modems 610. Using its MCS interface 710, the radio modem 610 may indicate a time instance of a periodic event related to its operation. In practice these instances may include times when radio modem 610 is active and may be preparing to communicate or communicating. Events occurring prior to or during a transmission or reception mode may be used as a time reference (e.g., in case of GSM, the frame edge may be indicated in a modem that is not necessarily transmitting or receiving at that moment, but we know based on the frame clock that the modem is going to transmit [x]ms after the frame clock edge). Basic principle for such timing indications is that the event is periodic in nature. Every incident needs not to be indicated, but the MRC 600 may calculate intermediate incidents itself. In order for that to be possible, the controller may also require other relevant information about the event, e.g. periodicity and duration. This information may be either embedded in the indication or the controller may get it by other means. Most importantly, timing indications need to be such that the controller can acquire a radio modem's basic periodicity and timing. The timing of an event may either be in the indication itself, or it may be implicitly defined from the indication information by MRC 600 (or radio activity controller 720).

In general terms these timing indications need to be provided on periodic events like: schedule broadcasts from a base station (typically TDMA/MAC frame boundaries) and own periodic transmission or reception periods (typically Tx/Rx slots). Those notifications need to be issued by the radio modem 610: (1) on network entry (i.e. modem acquires network synchrony), (2) on periodic event timing change e.g. due to a handoff or handover and (3) as per the policy and configuration settings in the multiradio controller (monolithic or distributed).

In at least one embodiment of the present invention, various messages that are exchanged between the aforementioned communication components in WCD 100 may be used to dictate behavior on both a local (radio modem level) and global (WCD level) basis. MRC 600 or radio activity controller 720 may deliver a schedule to radio modem 610 with the intent of controlling that specific modem, however, radio modem 610 may not be compelled to conform to this schedule. The basic principle is that radio modem 610 is not only operating according to multiradio control information (e.g., operates only when MRC 600 allows) but is also performing internal scheduling and link adaptation while taking MRC scheduling information into account.

#### IX. Example Software-Defined Radio (SDR) Module.

The various examples of multiradio control implementation disclosed herein have been explained utilizing only hardware-based radio modules. A hardware-based radio module may be, for example, a radio module that relies primarily upon hardware components and static software elements (e.g., hard-coding or rewritable code that does not change during operation) for establishing communication. However, in accordance with at least one embodiment of the present

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invention, one or more transports may be supported in an apparatus by radio modules that rely more heavily upon a reconfigurable software-based element. The software-based element may be reconfigured at runtime, and therefore, these radio modules may be reconfigured to emulate various functionality that was traditionally only available through discrete modules.

In general, software-based elements may be implemented using known software tools (e.g., languages, compiled code, etc.) to establish instruction sets (e.g., programs, modules, etc.) that are executable by a processor. The functionality of a hardware-based component, or one or more elements of a hardware-based component, may be “defined” in terms of a set of instructions or conditions that exist within a program or module. Programs may be stored, for example, in a static or dynamic memory within an apparatus. When executed by a processor, these programs may access, manipulate, configure, etc. hardware elements in the apparatus in order to create the desired functionality. Examples of memory may include fixed or removable computer-readable media in a variety of formats (e.g., magnetic, optical, electronic, etc.).

An example implementation of a software-defined radio (SDR) module usable in accordance with various embodiments of the present invention is disclosed in FIG. 11. Initially, a partial representation of an example WCD 100, such, for example, as previously described herein with respect to various multiradio implementation examples, is shown at 1100. In this example, WCD 100 may employ distinct hardware-based communication modules corresponding to, for example, long-range communications 310, broadcast receivers 312 and short-range communications 320. However, the configuration of multiradio systems is not specifically limited to the structure shown at 1100.

For example, an alternative communication configuration for WCD 100 is shown at 1102. In this example, the apparatus may incorporate at least one SDR module 1104 in lieu of one or more discrete hardware-based radio modules. While the flexibility of SDR module 1104 may provide an option of omitting some communication hardware from WCD 100, this does not preclude the incorporation of one or more hardware-based modules 1106. Implementations incorporating both SDR radio modules 1104 and hardware-based modules 1106 (represented as optional in FIG. 11 through the use of dotted lines) are possible. Combined hardware-based and software-based technology implementations may be employed, for example, in situations where specialized hardware is required to support particular transports, it is more economical to implement a hardware-based solution for a particular transport, an SDR module 1102 and a hardware-based module 1106 are used to support transports that often operate concurrently (e.g., transports that do not interfere with each other, and therefore, can operate at the same time), etc.

Now referring to FIG. 12, a more detailed example of a SDR module is disclosed in accordance with at least one embodiment of the present invention. “Radio computers,” which fall within the broader software-defined radio (SDR) concept, include platform architectures in which the different radio systems are loaded as software (e.g., as radio programs) and in which as single HW/SW platform can be used to implement different wireless connectivity features on shared processing resources. The radio programs may serve the purpose of cellular communication, local connectivity, broadcast, navigation, etc., and they can be integrated into legacy (existing) radio systems or form totally new radios. Further, “cognitive” radios include the ability to sense the surrounding environment and to share this information with peers. The sensed information may be utilized, for example, in distrib-

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uted sensing strategies that allow apparatuses to make localized decisions in view of the entire environment when configuring communication.

FIG. 12 explains an example of a possible implementation of a SDR 1102 utilizing a previously disclosed embodiment of the present invention. SDR 1102 may interact with multiradio control features (e.g., MRC 600) via MCS 700 and/or via common interfaces that may be components of master control system 640. For example, SDR 1102 may include a multiradio access interface 1108 configured for the transmission and reception of delay-sensitive information via MCS 700. In addition, flow controller 1112 in SDR 1102 may interact with programs in master control system 640 in order to regulate the flow of messages being sent from, and being received into, SDR 1102. Multiradio access interface 1108 and flow controller 1112 may interact with various software components within SDR 1102 to emulate various hardware-based radio modules.

For example, information received via the aforementioned interfaces may be used to determine how SDR 1102 is to be configured. As part of this configuration, radio connection manager 1110 may receive data from multiradio access interface 1108 and/or flow controller 1112. This data may include at least one of instruction information (e.g., rules or preferences regarding which transports to utilize in certain situations) and messages awaiting transmission. Radio connection manager 1110 may then interact with some or all of configuration manager 1114, local multiradio control 1116 and resource manager 1118 in order to configure SDR 1102. For instance, configuration manager 1114 may provide information regarding resources required for supporting a particular wireless transport, and resource manager 1118 may determine if these resources are available. If radio connection manager 1110 decides that it is possible to configure SDR 1102 to support the particular wireless transport (e.g., in view of the information provided by the other modules) then local multiradio control 1116 may implement the configuration. While an example of a usable configuration for SDR 1102 has been disclosed in FIG. 12, other configurations are also possible in accordance with various embodiments of the present invention. For example, in an alternate configuration the functionality of MRC 600 and local multiradio controller 1116 may be implemented as a single functional element in WCD 100.

In implementing a particular radio configuration, some or all of software modules 1110-1118 may interact with unified radio system interface 1120 in order to establish settings that will allow SDR 1102 to emulate a desired radio functionality. For example, unified radio systems may include both protocol information 1122 and device information 1124 that may be usable when replicating the functionality of hardware-based radios. The configured software resources may then access hardware resources (e.g., antennas 1126) to send and/or receive wireless messages. For example, information in protocols 1122 and devices 1124 may be accessed and/or manipulated in order to emulate the functionality of a radio module that is configured to operate using a first transport (e.g., Bluetooth™ (BT)), and at the conclusion of activity may be reconfigured to support other communication in WCD 100 (e.g., WLAN).

In addition, it may be possible for SDR module 1108 to have cognitive features. Characteristics like apparatus status (e.g., process load, pending messages, power condition, etc.) and the environment proximate to an apparatus may be utilized to configure SDR module 1102. For example, resources in SDR module 1102, another radio module, or elsewhere in WCD 100 may be able to identify signals that could poten-



tially interfere with apparatus communication. The identification of signal interference may be provided from sensor information (e.g., a sensor may detect a signal in proximity to an apparatus) and/or may be identified through information that is already “known” to WCD 100. For example, MRC 600 may schedule communication in a multiradio system, and therefore, some or all of the schedule information may be provided to, or accessed by, SDR module 1102. Regardless of the source, information on potential interference signals may be utilized when determining the optimum configuration for SDR module 1102.

In accordance with various embodiments of the present invention, SDR module 1102 may interact with various program modules 1128 residing in at least one of MRC 600 or master control system 640. Program modules 1128 may provide apparatus side coordination of communication when, for example, multiple SDR modules 1102 are active, or when SDR module 1102 is active at the same time as a hardware-based radio module. Example program modules that may exist within program modules 1128 include, but are not limited to, mobility policy manager 1130, networking stack 1120 and administrator 1134. In at least one scenario, mobility policy manager 1130 may define preferences and/or rules that control utilization of transports in an apparatus (e.g., WCD 100). These preferences and/or rules may be based on various apparatus, application or user-defined characteristics. For example, the number of messages pending for each transport in networking stack 1132 may determine the next transport that will be implemented (e.g., a priority between the active transports), and therefore, the next configuration for SDR module 1102. In making this determination, mobility policy manager 1130 may work with administrator 1134 to create an appropriate implementation schedule so that communication may continue within the guidelines set forth in the preferences and/or rules.

#### X. Example Configuration Methodology for SDR Modules

As generally set forth above, an apparatus may utilize a variety of characteristic information when determining how to configure a SDR module 1102. However, characteristic information pertaining only to the apparatus itself may not address all issues that could potentially influence a transaction (e.g., including characteristics that may exist in one or more apparatuses with which communication is desired). In accordance with various embodiments of the present invention, conditions that exist in or around other apparatuses participating in wireless communication may, in some instances, alter the determination process with respect to configuring SDR module 1102.

FIG. 13 discloses an example including two apparatuses. While FIG. 13 discloses a scenario where a first apparatus desires to establish wireless communication (e.g., a wireless link) with a second apparatus, this example is presented herein only for the sake of explanation. As such, the present invention is not limited only to the disclosed interaction (e.g., may involve more than two apparatuses) or any particular wired or wireless transports. Further, while various implementations of the present invention have been described herein as integrated with a multiradio control system, various embodiments of the present invention may also operate in standalone situations (e.g., configurations where no multiradio control has been established).

In this non-limiting example, apparatus A 1300 has a requirement to interact with apparatus B 1302 in FIG. 13. Such a requirement to establish communication may be initiated by, for example, applications and/or utilities executing on apparatus A 1300, user interaction with apparatus A 1300, etc. In response to this requirement, apparatus A 1300 may

send a wireless inquiry to apparatus B 1302. The wireless inquiry may be sent, for example, utilizing a channel (e.g., an initialization channel) that is known to (e.g., predefined or predetermined) each apparatus. Apparatus B 1302 may acknowledge receipt of the inquiry from apparatus A 1300, and may in turn respond with one or more messages accepting the invitation to communicate and containing remote characteristics. Remote characteristics comprise information related to the apparatus with which communication is desired (e.g., apparatus B 1302), and may include information regarding apparatus status and/or environmental conditions proximate to the apparatus. For instance, apparatus status information may include apparatus communication capabilities and/or preferences, current apparatus power condition, current apparatus operational condition, current communication activity including transports active in the apparatus and a number of messages pending for each active transport, etc. Information pertaining to environmental conditions may include signals sensed in proximity to the apparatus that may potentially cause interference, communication scheduled in the apparatus, the identification of other apparatuses operating in proximity, etc. Some or all of this information may be provided in response to the inquiry of apparatus A 1300.

Apparatus A 1300 may also determine characteristics pertaining to itself, which are designated local characteristics in FIG. 13. Local characteristics may include all of the information discussed above with respect to remote characteristics, but from the perspective of the initiating apparatus. While local characteristics are formulated after remote characteristics in the example of FIG. 13, the determination of local characteristics is not limited to this temporal organization. In particular, the determination of local characteristics may occur before, during or after the receipt of remote characteristics from apparatus B 1302. Once Apparatus A 1300 has both the remote and local characteristic information, a configuration for SDR module 1102 may be formulated. The configuration may define a transport, or a list of transports (e.g., in priority order), for use in communication with apparatus B 1302, channel selection for each transport (e.g., hopping patterns), error correction, Quality of Service (QoS) requirements, operational schemes (e.g., power saving, high speed, etc.), radio module priority (for conflict resolution), etc.

After formulation of the configuration is complete, the configuration may be sent to apparatus B 1302. In various embodiments of the present invention, the configuration may be sent to apparatus B 1302 on the initialization channel. Apparatus A 1300 and apparatus B 1302 may then set the configuration. Setting a configuration may include, for example, programming one or more SDR modules 1102 in each apparatus for establishing communication in accordance with the configuration. After the configuration is set in apparatus A 1300 and apparatus B 1302, either apparatus may initiate communication (e.g., establish a wireless link between apparatuses).

It is important to note that, in various embodiments of the present invention, the communication may continue in accordance with the existing configuration until an event occurs that would necessitate a new configuration. Examples of events that may necessitate a new configuration may include, but are not limited to, fulfillment of the communication requirement, a loss of wireless connection between the apparatuses, sensed interference in proximity to either apparatus, a higher priority communication in one or both of the apparatuses that could conflict with current communication, a status change in either apparatus (e.g., power depletion), etc.

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A flowchart of an example configuration process in accordance with at least one embodiment of the present invention is disclosed in FIG. 14A. The process may begin in step 1400 with the realization of a communication requirement in an apparatus. A determination may then be made in step 1402 as to whether any other apparatuses that can fulfill the requirement are within communication range of the apparatus. If no other apparatuses are discovered, then in step 1404 the process may enter a failure mode, wherein the failure mode may include one or more activities executed when the requirement cannot be fulfilled. Activities may include, for example, a visible, audible or tactile notification of communication failure to an apparatus user. The process may then return to step 1400 to await subsequent requirements for communication.

If at least one other apparatus that can fulfill the communication requirement is detected within range of the apparatus, then in step 1406 a connection request may be sent to the other apparatus. Connection requests may be sent on a channel known to both apparatuses (e.g., an initialization channel). If no response is received from the other apparatus in step 1408, then in step 1410 a determination may be made as to whether a retry condition has been exceeded. Examples of retry conditions include a duration of time since the original connection attempt, a number of retries, etc. Connection requests may continue in step 1406 until the retry condition is exceeded (step 1410), at which point the failure mode described in step 1404 may be triggered.

If the other apparatus acknowledges the connection request, then in step 1412 an inquiry may be sent to the other apparatus. The inquiry may request, or trigger the provision of, remote characteristic information from the other apparatus. If remote characteristic information is not received in step 1414, then a determination may be made in step 1408 as to whether the wireless connection was lost. If a response is received in step 1414 (e.g., including remote characteristics pertaining to the other apparatus), then in step 1416 local characteristics related to the initiating apparatus may be determined. As stated above, steps 1414 and 1416 do not have to occur in the order depicted in FIG. 14A, as the determination of local characteristics may occur in the initiating apparatus before, during or after the receipt of the remote characteristics.

The initiating apparatus may then formulate a configuration based on at least the remote characteristic information and the local characteristic information in step 1418. The completed configuration may, for example, allow an apparatus to program one or more SDR modules 1102 for wireless communication. The configuration may then be sent to the other apparatus in step 1420. In accordance with at least one embodiment of the present invention, the configuration may be sent from the initiating apparatus to the other apparatus on the initialization channel. For example, the configuration may be set in the initiating apparatus (step 1422) by ceasing interaction with the other apparatus on the initialization channel, and then programming one or more SDR modules 1102 to communicate in accordance with the configuration.

In step 1424 the connection defined by the configuration may be established. The connection may be, for example, a wireless link on a channel different than the initialization channel, or even via a totally different wireless transport. If a connection fails to be established, as determined in step 1426, then the process may return to step 1402 to determine if the other apparatus can still be detected. For example, the other apparatus originally discovered in step 1402 may have moved outside of the range of the wireless transport configured in step 1422 by the time a connection is attempted in step 1424. If the connection (e.g., wireless link) defined by the configuration

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is established in step 1426, the connection may continue in step 1428 until an event occurs that would necessitate the formulation of a new configuration. For example, completion of the current communication requirement, an interference signal sensed in proximity to one or both apparatuses, a higher priority communication in one of the apparatuses, etc. may be considered events that would cause the process to return to step 1400 in preparation for the formulation of a new configuration based on, for example, a new communication requirement.

A flowchart depicting an example process for establishing a wireless connection from the perspective of an apparatus that is receiving the initial inquiry, in accordance with at least one embodiment of the present invention, is now disclosed with respect to FIG. 14B. Initially, a wireless communication may be received by an apparatus (e.g., apparatus B 1302) in step 1450. A determination may then be made in step 1452 as to whether the communication comprises an inquiry requesting characteristic information from the receiving apparatus. If no characteristic information is requested, then in step 1454 a link may be negotiated in accordance with standard communication methodology (e.g., based on the protocol for the wireless transport that is currently being utilized), which may be followed by link establishment in step 1456.

If in step 1452 a determination is made that a characteristic information inquiry is present in the received communication, then the receiving apparatus may formulate characteristic information concerning itself (e.g., in accordance with the various examples presented herein). While characteristic information formulation is shown as step 1458 in the FIG. 14B process, the formulation of characteristic information is not strictly limited to this instance. The formulation of characteristic information may also occur before receiving the inquiry, periodically, etc. A response may then be sent to the inquiring apparatus in step 1460, the response comprising at least the characteristic information. The receiving device may then enter a waiting loop in steps 1462 and 1464. For example, the receiving apparatus may wait for a configuration from the initiating apparatus until a condition is exceeded (e.g., until a duration from the time that the characteristic information response was sent, until a number of retry transmissions has been exceeded, etc.). In the example of a retry limit condition, the receiving apparatus may attempt to resend the characteristic information response in order to ensure that this information was successfully received. If no configuration is received, and the condition is exceeded in step 1464, then in step 1466 an error condition may commence. Examples of activities that may be executed in an error condition may include, for example, displaying notification to a user that no configuration was received, reformulating and retransmitting the characteristic information to the initiating apparatus, verification of the presence of the initiating apparatus, etc. The process may then restart in step 1450 with the receiving apparatus awaiting further communication.

If in step 1462 a communication configuration is received from the initiating apparatus, then in step 1468 the received communication configuration may be implemented in the receiving apparatus. Implementation of the configuration in the receiving apparatus may include, for example, the configuration of a hardware-based radio module (or alternatively of a SDR module enabled to emulate hardware-based radio functionality) to communicate utilizing particular wireless transports, particular channels or certain features/modes (e.g., error checking, power saving, etc.). A link in accordance with the received communication configuration may then be established in step 1456. After the communication transac-



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tion is completed, the process may again reinitiate in step 1450, wherein the receiving apparatus awaits further communication.

Accordingly, it will be apparent to persons skilled in the relevant art that various changes in form a and detail can be made therein without departing from the spirit and scope of the invention. The breadth and scope of the present invention should not be limited by any of the above-described example embodiments, but should be defined only in accordance with the following claims and their equivalents.

What is claimed:

1. A method, comprising:

initiating an inquiry from an apparatus to at least one other apparatus;

receiving remote characteristic information into the apparatus, the remote characteristic information comprising at least one of supported communication transport configuration information for the at least one other apparatus, power status information for the at least one other apparatus, processing load information for the at least one other apparatus, communication load information for the at least one other apparatus, proximate interference information for the at least one other apparatus and user preferences configured in the at least one other apparatus;

determining local characteristic information in the apparatus;

formulating a configuration in the apparatus, the configuration being based on the remote characteristic information and the local characteristic information;

sending the configuration from the apparatus to the at least one other apparatus;

implementing the configuration in the apparatus; and establishing communication between the apparatus and at least one other apparatus in accordance with the configuration.

2. The method of claim 1, wherein the inquiry is conducted via an initialization channel that is established in both the apparatus and the at least one other apparatus.

3. The method of claim 1, wherein local characteristic information comprises at least one of supported communication transport configuration information for the apparatus, power status information for the apparatus, processing load information for the apparatus, communication load information for the apparatus, proximate interference information for the apparatus, and user preferences configured in the apparatus.

4. The method of claim 1, wherein the configuration comprises at least information that is required by the apparatus and the at least one other apparatus in order to establish communication via a wireless transport, the wireless transport being determined based on the remote characteristic information and the local characteristic information.

5. The method of claim 1, wherein the configuration is sent via an initialization channel that is established in both the apparatus and the at least one other apparatus, the at least one other apparatus implementing the configuration that was sent from the apparatus.

6. The method of claim 1, wherein implementing the configuration comprises discontinuing communication occurring on an initialization channel and resetting resources in the apparatus and the at least one other apparatus in accordance with the configuration.

7. The method of claim 1, wherein the communication between the apparatus and the at least one other apparatus is

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established via a wireless transport that is different from the wireless transport utilized to transmit the inquiry from the apparatus.

8. A computer program product comprising computer executable program code recorded on a computer readable medium, the computer executable program code comprising:

computer program code configured to initiate an inquiry from an apparatus to at least one other apparatus;

computer program code configured to receive remote characteristic information into the apparatus, the remote characteristic information comprising at least one of supported communication transport configuration information for the at least one other apparatus, power status information for the at least one other apparatus, processing load information for the at least one other apparatus, communication load information for the at least one other apparatus, proximate interference information for the at least one other apparatus and user preferences configured in the at least one other apparatus;

computer program code configured to determine local characteristic information in the apparatus;

computer program code configured to formulate a configuration in the apparatus, the configuration being based on the remote characteristic information and the local characteristic information;

computer program code configured to send the configuration from the apparatus to the at least one other apparatus;

computer program code configured to implement the configuration in the apparatus; and

computer program code configured to establish communication between the apparatus and at least one other apparatus in accordance with the configuration.

9. The computer program product of claim 8, wherein the inquiry is conducted via an initialization channel that is established in both the apparatus and the at least one other apparatus.

10. The computer program product of claim 8, wherein local characteristic information comprises at least one of supported communication transport configuration information for the apparatus, power status information for the apparatus, processing load information for the apparatus, communication load information for the apparatus, proximate interference information for the apparatus, and user preferences configured in the apparatus.

11. The computer program product of claim 8, wherein the configuration comprises at least information that is required by the apparatus and the at least one other apparatus in order to establish communication via a wireless transport, the wireless transport being determined based on the remote characteristic information and the local characteristic information.

12. The computer program product of claim 8, wherein the configuration is sent via an initialization channel that is established in both the apparatus and the at least one other apparatus, the at least one other apparatus implementing the configuration that was sent from the apparatus.

13. The computer program product of claim 8, wherein implementing the configuration comprises discontinuing communication occurring on an initialization channel and resetting resources in the apparatus and the at least one other apparatus in accordance with the configuration.

14. The computer program product of claim 8, wherein the communication between the apparatus and the at least one other apparatus is established via a wireless transport that is different from the wireless transport utilized to transmit the inquiry from the apparatus.

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**15.** An apparatus, comprising:

at least one software-defined radio module; and  
a processor, the processor being configured to:

initiate an inquiry from to at least one other apparatus;  
receive remote characteristic information, the remote  
characteristic information comprising at least one of  
supported communication transport configuration  
information for the at least one other apparatus, power  
status information for the at least one other apparatus,  
processing load information for the at least one other  
apparatus, communication load information for the at  
least one other apparatus, proximate interference  
information for the at least one other apparatus and  
user preferences configured in the at least one other  
apparatus;

determine local characteristic information;

formulate a configuration, the configuration being based  
on the remote characteristic information and the local  
characteristic information;

send the configuration to the at least one other apparatus;

implement the configuration; and

establish communication with at least one other appara-  
tus in accordance with the configuration.

**16.** The apparatus of claim **15**, wherein the inquiry is con-  
ducted via an initialization channel that is established in both  
the apparatus and the at least one other apparatus.

**17.** The apparatus of claim **15**, wherein local characteristic  
information comprises at least one of supported communica-  
tion transport configuration information for the apparatus,  
power status information for the apparatus, processing load  
information for the apparatus, communication load informa-  
tion for the apparatus, proximate interference information for  
the apparatus, and user preferences configured in the appara-  
tus.

**18.** The apparatus of claim **15**, wherein the configuration  
comprises at least information that is required by the appara-  
tus and the at least one other apparatus in order to establish  
communication via a wireless transport, the wireless trans-  
port being determined based on the remote characteristic  
information and the local characteristic information.

**19.** The apparatus of claim **15**, wherein the configuration is  
sent via an initialization channel that is established in both the  
apparatus and the at least one other apparatus, the at least one  
other apparatus implementing the configuration that was sent  
from the apparatus.

**20.** The apparatus of claim **15**, wherein implementing the  
configuration comprises discontinuing communication  
occurring on an initialization channel and resetting resources  
in the apparatus and the at least one other apparatus in accor-  
dance with the configuration.

**21.** The apparatus of claim **15**, wherein the communication  
between the apparatus and the at least one other apparatus is  
established via a wireless transport that is different from the  
wireless transport utilized to transmit the inquiry from the  
apparatus.

**22.** An apparatus, comprising:

means for initiating an inquiry from the apparatus to at least  
one other apparatus;

means for receiving remote characteristic information into  
the apparatus, the remote characteristic information  
comprising at least one of supported communication  
transport configuration information for the at least one  
other apparatus, power status information for the at least  
one other apparatus, processing load information for the  
at least one other apparatus, communication load informa-  
tion for the at least one other apparatus, proximate

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interference information for the at least one other appa-  
ratus and user preferences configured in the at least one  
other apparatus;

means for determining local characteristic information in  
the apparatus;

means for formulating a configuration in the apparatus, the  
configuration being based on the remote characteristic  
information and the local characteristic information;

means for sending the configuration from the apparatus to  
the at least one other apparatus;

means for implementing the configuration in the apparatus;  
and

means for establishing communication between the appa-  
ratus and at least one other apparatus in accordance with  
the configuration.

**23.** A method, comprising:

receiving wireless communication in an apparatus;

if the wireless communication includes an inquiry request-  
ing characteristic information, determining characteris-  
tic information comprising at least one of supported  
communication transport configuration information for  
the apparatus, power status information for the appa-  
ratus, processing load information for the apparatus, com-  
munication load information for the apparatus, proxi-  
mate interference information for the apparatus and user  
preferences configured in the apparatus;

responding to the inquiry, the response comprising the  
characteristic information;

receiving further wireless communication in the apparatus,  
the further wireless communication including a configu-  
ration;

implementing the configuration in the apparatus; and  
establishing communication in accordance with the con-  
figuration.

**24.** A computer program product comprising computer  
executable program code recorded on a computer readable  
medium, the computer executable program code comprising:  
computer program code configured to receive wireless  
communication in an apparatus;

computer program code configured to, if the wireless com-  
munication includes an inquiry requesting characteristic  
information, determine characteristic information com-  
prising at least one of supported communication trans-  
port configuration information for the apparatus, power  
status information for the apparatus, processing load  
information for the apparatus, communication load  
information for the apparatus, proximate interference  
information for the apparatus and user preferences con-  
figured in the apparatus;

computer program code configured to respond to the  
inquiry, the response comprising the characteristic infor-  
mation;

computer program code configured to receive further wire-  
less communication in the apparatus, the further wire-  
less communication including a configuration;

computer program code configured to implement the con-  
figuration in the apparatus; and

computer program code configured to establish communi-  
cation in accordance with the configuration.

**25.** An apparatus, comprising:

at least one radio module; and

a processor, the processor being configured to:

receive wireless communication in an apparatus;

if the wireless communication includes an inquiry  
requesting characteristic information, determine  
characteristic information comprising at least one of  
supported communication transport configuration

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information for the apparatus, power status information for the apparatus, processing load information for the apparatus, communication load information for the apparatus, proximate interference information for the apparatus and user preferences configured in the apparatus; 5  
respond to the inquiry, the response comprising the characteristic information;  
receive further wireless communication in the apparatus, the further wireless communication including a configuration; 10  
implement the configuration in the apparatus; and  
establish communication in accordance with the configuration.  
26. An apparatus, comprising: 15  
means for receiving wireless communication in an apparatus;  
means for, if the wireless communication includes an inquiry requesting characteristic information, determin-

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ing characteristic information comprising at least one of supported communication transport configuration information for the apparatus, power status information for the apparatus, processing load information for the apparatus, communication load information for the apparatus, proximate interference information for the apparatus and user preferences configured in the apparatus;  
means for responding to the inquiry, the response comprising the characteristic information;  
means for receiving further wireless communication in the apparatus, the further wireless communication including a configuration;  
means for implementing the configuration in the apparatus; and  
means for establishing communication in accordance with the configuration.

\* \* \* \* \*

# **EXHIBIT F**

## **Prosecution History of the '213 Patent**

Docket No. 4208-4448

Express Mail No.

**27123**

↑CUSTOMER NUMBER↑

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**  
**UTILITY APPLICATION AND FEE TRANSMITTAL §(1.53(B))**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

Transmitted herewith for filing is the patent application of

Inventor(s) names and addresses:

- (1) Pertti Tolonen  
Aatelikuja 1A, 01520 Vantaa FINLAND

☐ Additional inventors are listed on a separate sheet

For: SOFTWARE-DEFINED RADIO CONFIGURATION

Enclosed Are:

- ☒ Application  
33 page(s) of specification  
1 page(s) of Abstract  
8 page(s) of claims  
23 sheets of ☒ Formal ☐ Informal drawings

☐ Declaration and Power of Attorney

- ☐ Unsigned  
☐ Newly Executed  
☐ Copy from prior application  
☐ Deletion of inventors including Signed Statement under 37 C.F.R. §1.63(d)(2)

- ☐ REQUEST AND CERTIFICATION UNDER 35 U.S.C. §122(b)(2)(B)(i) (form PTO/SB/35)  
As indicated on the attached Request and Certification, Applicant(s) certify that the invention disclosed in the attached application HAS NOT and WILL NOT be the subject of an application filed in another country, or under a multilateral agreement, that requires publication at eighteen months after filing. Applicant(s) therefore request(s) that the attached application NOT be published under 35 U.S.C. §122(b).

- ☐ Incorporation by Reference:  
☐ The entire disclosure of the prior application, from which a copy of the combined Declaration and Power of Attorney is supplied herein, is considered as being part of the disclosure of the accompanying application and is incorporated herein by reference.

- ☐ Deletion of Inventors (37 C.F.R. §1.63(d) and §1.33(b))

Signed statement attached deleting inventor(s) named in the prior application serial no. \_\_\_\_\_, filed \_\_\_\_\_.

- ☐ Microfiche Computer Program (Appendix)

☐ page(s) of Sequence Listing

Docket No. 4208-4448

Express Mail No.

- ☐ computer readable disk containing Sequence Listing
- ☐ Statement under 37 C.F.R. §1.821(f) that computer and paper copies of the Sequence Listing are the same
- ☐ Assignment Papers (assignment cover sheet and assignment documents)
- ☐ A check in the amount of \$40.00 for recording the Assignment
- ☐ Charge the Assignment Recordation Fee to Deposit Account No. **13-4500**, Order No. \_\_\_\_.
- ☐ Assignment Papers filed in the parent application Serial No. \_\_\_\_
- ☐ Certification of chain of title pursuant to 37 C.F.R. §3.73(b)
- ☐ Priority is claimed under 35 U.S.C. §119 for:  
Application No(s). \_\_\_\_, filed \_\_\_\_, in \_\_\_\_ (country).
- ☐ Certified Copy of Priority Document(s) [\_\_\_\_]
- ☐ filed herewith
- ☐ filed in application Serial No. \_\_\_\_, filed \_\_\_\_.
- ☐ English translation document(s) [\_\_\_\_]
- ☐ filed herewith
- ☐ filed in application Serial No. \_\_\_\_, filed \_\_\_\_.
- ☐ Priority is claimed under 35 U.S.C. §119(e) for:  
Provisional Application No. \_\_\_\_, filed \_\_\_\_.
- ☐ Information Disclosure Statement
- ☐ Copy of [\_\_\_\_] cited references
- ☐ PTO Form-1449
- ☐ References cited in parent application Serial No. \_\_\_\_, filed \_\_\_\_.
- ☐ Related Case Statement under 37 C.F.R. §1.98(a)(2)(iii)
- ☐ A copy of related pending U.S. Application(s) Serial No(s): \_\_\_\_, filed \_\_\_\_, respectively, is attached hereto.
- ☐ A copy of related pending U.S. Application(s) entitled, \_\_\_\_, filed \_\_\_\_ to inventor(s) \_\_\_\_, respectively, is attached hereto.
- ☐ A copy of each related application(s) was submitted in parent application serial no. \_\_\_\_, filed \_\_\_\_.
- ☐ Preliminary Amendment
- ☐ Return receipt postcard (MPEP 503)

Docket No. 4208-4448

Express Mail No.

- ☐ This is a ☐ continuation ☐ divisional ☐ continuation-in-part of prior application serial no. \_\_\_\_\_, filed \_\_\_\_\_, to which priority under 35 U.S.C. §120 is claimed.
- ☐ Cancel in this application original claims \_\_\_\_\_ of the parent application before calculating the filing fee. (At least one original independent claim must be retained for filing purposes.)
- ☐ A Preliminary Amendment is enclosed. (Claims added by this Amendment have been properly numbered consecutively beginning with the number following the highest numbered original claim in the prior application).
- ☐ The status of the parent application is as follows:
- ☐ A Petition for Extension of Time and a Fee therefor has been or is being filed in the parent application to extend the term for action in the parent application until \_\_\_\_\_.
- ☐ A copy of the Petition for Extension of Time in the co-pending parent application is attached.
- ☐ No Petition for Extension of Time and Fee are necessary in the co-pending parent application.
- ☐ Please abandon the parent application at a time while the parent application is pending or at a time when the petition for extension of time in that application is granted and while this application is pending has been granted a filing date, so as to make this application co-pending.
- ☐ Transfer the drawing(s) from the parent application to this application
- ☐ Amend the specification by inserting before the first line the sentence:  
This is ☐ continuation ☐ divisional ☐ continuation-in-part of co-pending application Serial No. \_\_\_\_\_, filed \_\_\_\_\_.

I. CALCULATION OF APPLICATION FEE				
Basic Fee (\$310/\$155)				\$ 310.00
Examination Fee (\$210/\$105)				\$ 210.00
Search Fee (\$510/\$255)				\$ 510.00
	Number Filed	Number Extra	Rate	
Total Claims	29 - 20 =	9 x	(\$50/\$25)	\$ 450.00
Independent Claims	8 - 3 =	0 x	(\$210/\$105)	\$ 1050.00
<input type="checkbox"/> Multiple Dependent Claims		If marked, add fee of \$370/\$185		\$ 0.00
Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee	
65- 100 =	0/ 50 =	(round up to the whole number)	(\$260/\$130)	\$ 0.00
TOTAL:				\$ 2,530.00

- ☐ Small entity status is or has been claimed. Reduced fees under 37 C.F.R. §1.9 (f) paid herewith \$\_\_\_\_\_.
- ☒ Charge fee to Deposit Account No. 13-4500, Order No. 4208-4448. A DUPLICATE COPY OF THIS SHEET IS ATTACHED.

Docket No. 4208-4448  
Express Mail No.

- ☒ The Commissioner is hereby authorized to charge any additional fees which may be required for filing this application pursuant to 37 CFR §1.16, **including all extension of time fees pursuant to 37 C.F.R. § 1.17 for maintaining copendency** with the parent application, or credit any overpayment to Deposit Account No. 13-4500, Order No. 4208-4448. A DUPLICATE COPY OF THIS SHEET IS ATTACHED.

Respectfully submitted,

MORGAN & FINNEGAN, L.L.P.

Dated: September 3, 2008

---

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Registration No. 56,641

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Docket No. 4208-4448

Express Mail No.

**27123**

↑CUSTOMER NUMBER↑

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**  
**UTILITY APPLICATION AND FEE TRANSMITTAL §(1.53(B))**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

Transmitted herewith for filing is the patent application of

Inventor(s) names and addresses:

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- ☐ Unsigned  
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☐ page(s) of Sequence Listing

Docket No. 4208-4448

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- ☐ Statement under 37 C.F.R. §1.821(f) that computer and paper copies of the Sequence Listing are the same
- ☐ Assignment Papers (assignment cover sheet and assignment documents)
- ☐ A check in the amount of \$40.00 for recording the Assignment
- ☐ Charge the Assignment Recordation Fee to Deposit Account No. **13-4500**, Order No. \_\_\_\_.
- ☐ Assignment Papers filed in the parent application Serial No. \_\_\_\_
- ☐ Certification of chain of title pursuant to 37 C.F.R. §3.73(b)
- ☐ Priority is claimed under 35 U.S.C. §119 for:  
Application No(s). \_\_\_\_, filed \_\_\_\_, in \_\_\_\_ (country).
- ☐ Certified Copy of Priority Document(s) [\_\_\_\_]
- ☐ filed herewith
- ☐ filed in application Serial No. \_\_\_\_, filed \_\_\_\_.
- ☐ English translation document(s) [\_\_\_\_]
- ☐ filed herewith
- ☐ filed in application Serial No. \_\_\_\_, filed \_\_\_\_.
- ☐ Priority is claimed under 35 U.S.C. §119(e) for:  
Provisional Application No. \_\_\_\_, filed \_\_\_\_.
- ☐ Information Disclosure Statement
- ☐ Copy of [\_\_\_\_] cited references
- ☐ PTO Form-1449
- ☐ References cited in parent application Serial No. \_\_\_\_, filed \_\_\_\_.
- ☐ Related Case Statement under 37 C.F.R. §1.98(a)(2)(iii)
- ☐ A copy of related pending U.S. Application(s) Serial No(s): \_\_\_\_, filed \_\_\_\_, respectively, is attached hereto.
- ☐ A copy of related pending U.S. Application(s) entitled, \_\_\_\_, filed \_\_\_\_ to inventor(s) \_\_\_\_, respectively, is attached hereto.
- ☐ A copy of each related application(s) was submitted in parent application serial no. \_\_\_\_, filed \_\_\_\_.
- ☐ Preliminary Amendment
- ☐ Return receipt postcard (MPEP 503)

Docket No. 4208-4448

Express Mail No.

- ☐ This is a ☐ continuation ☐ divisional ☐ continuation-in-part of prior application serial no. \_\_\_\_\_, filed \_\_\_\_\_, to which priority under 35 U.S.C. §120 is claimed.
- ☐ Cancel in this application original claims \_\_\_\_\_ of the parent application before calculating the filing fee. (At least one original independent claim must be retained for filing purposes.)
- ☐ A Preliminary Amendment is enclosed. (Claims added by this Amendment have been properly numbered consecutively beginning with the number following the highest numbered original claim in the prior application).
- ☐ The status of the parent application is as follows:
- ☐ A Petition for Extension of Time and a Fee therefor has been or is being filed in the parent application to extend the term for action in the parent application until \_\_\_\_\_.
- ☐ A copy of the Petition for Extension of Time in the co-pending parent application is attached.
- ☐ No Petition for Extension of Time and Fee are necessary in the co-pending parent application.
- ☐ Please abandon the parent application at a time while the parent application is pending or at a time when the petition for extension of time in that application is granted and while this application is pending has been granted a filing date, so as to make this application co-pending.
- ☐ Transfer the drawing(s) from the parent application to this application
- ☐ Amend the specification by inserting before the first line the sentence:  
This is ☐ continuation ☐ divisional ☐ continuation-in-part of co-pending application Serial No. \_\_\_\_\_, filed \_\_\_\_\_.

I. CALCULATION OF APPLICATION FEE				
Basic Fee (\$310/\$155)				\$ 310.00
Examination Fee (\$210/\$105)				\$ 210.00
Search Fee (\$510/\$255)				\$ 510.00
	Number Filed	Number Extra	Rate	
Total Claims	29 - 20 =	9 x	(\$50/\$25)	\$ 450.00
Independent Claims	8 - 3 =	0 x	(\$210/\$105)	\$ 1050.00
<input type="checkbox"/> Multiple Dependent Claims		If marked, add fee of \$370/\$185		\$ 0.00
Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee	
65- 100 =	0/ 50 =	(round up to the whole number)	(\$260/\$130)	\$ 0.00
			TOTAL:	\$ 2,530.00

- ☐ Small entity status is or has been claimed. Reduced fees under 37 C.F.R. §1.9 (f) paid herewith \$\_\_\_\_\_.
- ☒ Charge fee to Deposit Account No. 13-4500, Order No. 4208-4448. A DUPLICATE COPY OF THIS SHEET IS ATTACHED.

Docket No. 4208-4448  
Express Mail No.

- ☒ The Commissioner is hereby authorized to charge any additional fees which may be required for filing this application pursuant to 37 CFR §1.16, **including all extension of time fees pursuant to 37 C.F.R. § 1.17 for maintaining copendency** with the parent application, or credit any overpayment to Deposit Account No. 13-4500, Order No. 4208-4448. A DUPLICATE COPY OF THIS SHEET IS ATTACHED.

Respectfully submitted,

MORGAN & FINNEGAN, L.L.P.

Dated: September 3, 2008

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Elliot L. Frank  
Registration No. 56,641

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27123

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<b>Application Data Sheet 37 CFR 1.76</b>		<b>Attorney Docket Number</b>	4208-4448
		<b>Application Number</b>	
<b>Title of Invention</b>	SOFTWARE-DEFINED RADIO CONFIGURATION		
<p>The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.</p> <p>This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.</p>			

**Secrecy Order 37 CFR 5.2**

<input type="checkbox"/>	Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
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<b>Applicant 1</b>					<b>Remove</b>
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<b>Residence Information (Select One)</b> <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
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<input type="checkbox"/> An Address is being provided for the correspondence Information of this application.			
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**Application Information:**

<b>Title of the Invention</b>	SOFTWARE-DEFINED RADIO CONFIGURATION		
<b>Attorney Docket Number</b>	4208-4448	<b>Small Entity Status Claimed</b> <input type="checkbox"/>	
<b>Application Type</b>	Nonprovisional		
<b>Subject Matter</b>	Utility		
<b>Suggested Class (if any)</b>		<b>Sub Class (if any)</b>	
<b>Suggested Technology Center (if any)</b>			
<b>Total Number of Drawing Sheets (if any)</b>	23	<b>Suggested Figure for Publication (if any)</b>	

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	4208-4448
		Application Number	
Title of Invention	SOFTWARE-DEFINED RADIO CONFIGURATION		

**Publication Information:**

<input type="checkbox"/>	Request Early Publication (Fee required at time of Request 37 CFR 1.219)
<input type="checkbox"/>	<b>Request Not to Publish.</b> I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application has <b>not and will not</b> be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

**Representative Information:**

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Enter either Customer Number or complete the Representative Name section below. If both sections are completed the Customer Number will be used for the Representative Information during processing.			
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This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.			
Prior Application Status		<a href="#">Remove</a>	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the <b>Add</b> button.			<a href="#">Add</a>

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This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(a).			
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Application Number	Country i	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
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<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	4208-4448
		Application Number	
Title of Invention	SOFTWARE-DEFINED RADIO CONFIGURATION		

If the Assignee is an Organization check here. <input checked="" type="checkbox"/>			
Organization Name	NOKIA CORPORATION		
<b>Mailing Address Information:</b>			
Address 1	Keilalahdentie 4		
Address 2			
City	Espoo	State/Province	
Country i	FI	Postal Code	FIN-02150
Phone Number		Fax Number	
Email Address			
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**Signature:**

A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.					
Signature	/Elliot L. Frank/			Date (YYYY-MM-DD)	2008-09-03
First Name	Elliot	Last Name	Frank	Registration Number	56641

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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## **SOFTWARE-DEFINED RADIO CONFIGURATION**

Inventor: Pertti TOLONEN

### **BACKGROUND**

#### **1. Field of Invention:**

**[0001]** The present invention relates to wireless communication, and more specifically, to a system for facilitating wireless communication connections between configurable radio devices.

#### **2. Background:**

**[0002]** Wireless apparatuses continue to proliferate in the global marketplace due to technological improvement in both the quality of communication and device functionality. These wireless communication devices (WCDs) have become common for both personal and business use, allowing users to transmit and receive voice, text and graphical data from a multitude of geographic locations. Communication networks usable by these devices may span different frequencies and transmission distances.

**[0003]** For example, cellular networks may facilitate WCD communication over large geographic areas. These technologies are commonly divided by generation, starting in the 1970s-1980s with first generation (1G) analog cellular telephones that provided baseline voice communication, to modern digital handsets. GSM is an example of a widely employed 2G digital cellular network communicating in the 900 MHZ/1.8 GHZ bands in Europe and at 850 MHz and 1.9 GHZ in the United States. GSM provides voice communication and supports text transmission via the Short Messaging Service (SMS). SMS may transmit and receive text messages of up to 160 characters, while providing data transfer to packet networks, ISDN and POTS users at 9.6 Kbps, while Multimedia Messaging Service (MMS) allows for the transmission of sound, graphics and video files in addition to simple text. Emerging technologies such as Digital Video Broadcasting for Handheld Devices (DVB-H) will make streaming digital video, and other similar content, available for direct transmission to a WCD. While long-range communication networks are a well-accepted means for transmitting and

receiving data, due to cost, traffic and legislative concerns, these networks may not be appropriate for all data applications.

**[0004]** Short-range wireless networks may provide communication solutions that avoid some of the problems seen in large cellular networks. Bluetooth™ is an example of a short-range wireless technology quickly gaining acceptance in the marketplace. A 1 Mbps Bluetooth™ radio may transmit and receives data at a rate of 720 Kbps within a range of 10 meters, and may transmit up to 100 meters with additional power boosting. Enhanced data rate (EDR) technology also available may enable maximum asymmetric data rates of 1448 Kbps for a 2 Mbps connection and 2178 Kbps for a 3 Mbps connection. A plurality of devices within operating range of each other may automatically form a network group called a “piconet”. Any apparatus may promote itself to the master of the piconet, allowing it to control data exchanges with up to seven “active” slaves and 255 “parked” slaves. Active slaves may exchange data based on the clock timing of the master, while parked slaves monitor a beacon signal in order to stay synchronized with the master. These apparatuses may continually switch between active communication and power saving modes in order to transmit data to other piconet members. In addition to Bluetooth™ other popular short-range wireless networks include WLAN (of which “Wi-Fi” local access points communicating in accordance with the IEEE 802.11 standard, is an example), WUSB, UWB, ZigBee (802.15.4, 802.15.4a), and UHF RFID.

**[0005]** Manufacturers may also incorporate resources for providing enhanced functionality in WCDs (e.g., components and/or software for performing close-proximity wireless communication). Sensors, scanners, etc. may be utilized to read visual or electronic information into an apparatus. In an example transaction, users may hold their WCD in proximity to a target, aiming their WCD at an object (e.g., to take a picture) or sweeping the device over a printed tag or document to obtain information. These technologies include machine-readable mediums such as radio frequency identification (RFID), Infra-red (IR) communication, optical character recognition (OCR) and various other types of visual, electronic and magnetic scanning that may be utilized to quickly input desired information into the WCD without the need for manual entry by a user.

**[0006]** These examples of additional communication functionality may be implemented in apparatuses utilizing various combinations of hardware and/or software. For instance, one or

more functions that were previously handled by discrete components (e.g., hardware-based wireless radios) may be handled by more generic software-driven processes. Moreover, the ability to reconfigure software-based modules during runtime may, in some instances, allow a software-based solution to emulate the functionality of multiple traditional hardware modules. The ability to implement flexible configuration may allow one or more hardware components to be omitted from an apparatus in favor of a software-based solution that is configurable to perform the same or similar function, while being more efficient in terms of power, space, etc.

**[0004]** However, problems can also spawn from the ability to reconfigure software-based modules during runtime. The runtime flexibility of software-driven solutions, while beneficial, can also increase the potential for negatively impacting (e.g., interfering with) other processes also occurring on the executing apparatus, on another apparatus with which communication is desired, etc. Further, software-based solutions must be able to interact with older discrete implementations by accounting for the limitations inherent in these hardware-based solutions.

### **SUMMARY**

**[0005]** Various embodiments of the present invention are directed to at least a method, computer program product, apparatus and system for configuring communication resources that are at least partially based upon reconfigurable software modules. For example, an apparatus may utilize a plurality of transports for communication, wherein the transports are supported by one or more radio modules. The one or more radio modules may comprise hardware-based radio modules and software-defined radio (SDR) modules including a reconfigurable software element that allows the radio module to emulate the functionality of multiple hardware-based radios. In accordance with at least one embodiment of the present invention, SDR modules in an apparatus may formulate a communication configuration for use in communicating with another apparatus based on remote characteristic information (e.g., information corresponding to the apparatus with which communication is desired) and local characteristic information pertaining to the apparatus.

**[0006]** In an example implementation, an apparatus may desire to communicate with another apparatus. In order to configuration, the apparatus may first make an inquiry to the other device utilizing a initialization channel. Initialization channels may be, for example, predefined

channels in a wireless transport that are reserved for communication establishment. The inquiry, if successfully received in the other apparatus, may prompt a response message to the inquiring apparatus, the response message including at least remote characteristic information.

**[0007]** Remote characteristic information may include, for example, information related to the abilities and/or status of the other apparatus, and may further incorporate environmental information concerning possible interference known to (e.g., in the case other transports that are currently being utilized), or sensed by, the other apparatus. A determination may also be made with respect to local characteristic information, wherein local characteristic information may be similar to the remote characteristic information but pertaining instead to the initiating apparatus.

**[0008]** The initiating apparatus may then formulate a configuration based at least upon the received remote characteristic information and the local characteristic information. In at least one embodiment of the present invention, the configuration may comprise information usable by resources in one or both of the initiating apparatus and the other apparatus for establishing a link between the apparatuses. The configuration may then be sent from the initiating apparatus to the other apparatus (e.g., via the initialization channel), wherein the configuration may be utilized for resource configuration. Similarly, the configuration information already residing on the initiating apparatus may also be utilized for configuring resources. The resulting resource configuration in each apparatus allows for the establishment of communication between the apparatuses, wherein the communication takes into account the condition of each apparatus.

**[0009]** The foregoing summary includes example embodiments of the present invention that are not intended to be limiting. The above embodiments are used merely to explain selected aspects or steps that may be utilized in implementations of the present invention. However, it is readily apparent that one or more aspects, or steps, pertaining to an example embodiment can be combined with one or more aspects, or steps, of other embodiments to create new embodiments still within the scope of the present invention. Therefore, persons of ordinary skill in the art would appreciate that various embodiments of the present invention may incorporate aspects from other embodiments, or may be implemented in combination with other embodiments.

**DESCRIPTION OF DRAWINGS**

[0010] Various embodiments of the present invention may be understood in view of the following configuration examples taken in conjunction with the drawings, wherein:

[0011] FIG. 1 discloses an example of a wireless operational environment, including wireless transports having different effective ranges.

[0012] FIG. 2 discloses a modular example of a wireless communication device that may be usable in accordance with at least one embodiment of the present invention.

[0013] FIG. 3 discloses a structural representation of the example previously described with respect to FIG. 2.

[0014] FIG. 4 discloses an operational example of communication utilizing a wireless transport in accordance with at least one embodiment of the present invention.

[0015] FIG. 5 discloses an operational example wherein interference may occur during the concurrent operation of multiple radio modems within the same apparatus.

[0016] FIG. 6A discloses a structural example of a wireless communication device including a multiradio controller in accordance with at least one embodiment of the present invention.

[0017] FIG. 6B discloses a more detailed structural representation of FIG. 6A including the multiradio controller and the radio modems.

[0018] FIG. 6C discloses an operational example of a wireless communication device including a multiradio controller in accordance with at least one embodiment of the present invention.

[0019] FIG. 7A discloses a structural example of a wireless communication device including a multiradio control system in accordance with at least one embodiment of the present invention.

[0020] FIG. 7B discloses a more detailed structural representation of FIG. 7A including the multiradio control system and the radio modems.

**[0021]** FIG. 7C discloses an operational example of a wireless communication device including a multiradio control system in accordance with at least one embodiment of the present invention.

**[0022]** FIG. 8A discloses a structural example of a wireless communication device including a distributed multiradio control system in accordance with at least one embodiment of the present invention.

**[0023]** FIG. 8B discloses a more detailed structural representation of FIG. 8A including the distributed multiradio control system and the radio modems.

**[0024]** FIG. 8C discloses an operational example of a wireless communication device including a distributed multiradio control system in accordance with at least one embodiment of the present invention.

**[0025]** FIG. 9A discloses a structural example of a wireless communication device including a distributed multiradio control system in accordance with an alternative embodiment of the present invention.

**[0026]** FIG. 9B discloses a more detailed structural representation of FIG. 9A including the distributed multiradio control system and the radio modems.

**[0027]** FIG. 9C discloses an operational example of a wireless communication device including a distributed multiradio control system in accordance with the alternative embodiment of the present invention disclosed in FIG. 9A.

**[0028]** FIG. 10 discloses an example of an information packet usable with at least one embodiment of the present invention.

**[0029]** FIG. 11 discloses an example of a software-defined radio module usable in implementing various embodiments of the present invention.

**[0030]** FIG. 12 discloses an example modular representation of the software-defined radio module disclosed in FIG. 11.

**[0031]** FIG. 13 discloses an operational example in accordance with at least one embodiment of the present invention.

[0032] FIG. 14A discloses a flowchart for an example configuration process from the initiator side in accordance with at least one embodiment of the present invention.

[0033] FIG. 14B discloses a flowchart for an example configuration process from the receiving side in accordance with at least one embodiment of the present invention.

### **DESCRIPTION OF EXAMPLE EMBODIMENTS**

[0034] While the present invention has been described herein in terms of a variety of embodiment examples, changes can be made therein without departing from the spirit and scope of the invention, as set forth in the appended claims.

#### **I. Wireless communication over different communication networks**

[0035] Wireless communication devices may transmit and receive information over a wide array of wireless communication networks, each with different advantages regarding speed, range, quality (error correction), security (encoding), etc. These characteristics may dictate, for example, the amount of information that can be transferred to a receiving apparatus, and the duration of the information transfer. FIG. 1 includes an example of a WCD and how it may interact with various types of wireless networks.

[0036] In FIG. 1, user 110 possesses WCD 100. The apparatus shown is a high functionality portable device, however, usable apparatuses span a range from basic cellular handsets to more wirelessly enabled palmtop or laptop computers. Close-proximity communication 130 may include close proximity inter-apparatus communication or transponder-type interactions wherein only the scanning device may require a power source. In example transponder interaction, WCD 100 may scan source 120 via short-range communication. A transponder in source 120 may use the energy and/or clock signal contained within the scanning signal, as in the case of RFID communication, to respond with data stored in the transponder. Machine readable technologies may have an effective transmission range on the order of ten feet, and may be able to deliver stored data in amounts from a bit to over a megabit (or 125 Kbytes) relatively quickly. These characteristics make such technologies well suited for identification

purposes, such as in receiving an account number for a public transportation provider, a key code for an automatic electronic door lock, an account number for a credit or debit transaction, etc.

**[0037]** The transmission range between two apparatuses may be extended if both device can participate in powered communication using more robust wireless transports. Short-range active communication 140 may include applications wherein the sending and receiving devices are both active. An example situation would include user 110 coming within effective transmission range of a Bluetooth<sup>TM</sup>, WLAN, UWB, WUSB, etc. access point. In the case of Bluetooth<sup>TM</sup>, a network may automatically be established to transmit information to WCD 100 possessed by user 110. The amount of information that can be conveyed is unlimited, except that it must all be transferred in the time when user 110 is within effective transmission range of the access point. The higher complexity attributed to these wireless transports means that additional time may be required when establishing an initial connection to WCD 100, which may be increased if a large number of devices are queued for service in the area proximate to the access point. The transmission range of these transports may vary depending on the technology and may, for example, extend from 30 ft. to over 300 ft. with additional power boosting.

**[0038]** Long-range networks 150 may be used to provide virtually uninterrupted communication coverage for WCD 100. Land-based radio stations or satellites may be used to relay various communication transactions worldwide. While these systems are extremely functional, the use of these systems is often charged on a per-minute basis to user 110, not including additional charges for data transfer (e.g., wireless Internet access). Further, the regulations covering these systems may cause additional overhead for both the users and providers, making the use of these systems more cumbersome.

## II. Wireless communication device

**[0039]** As previously described, various embodiments of the present invention may be implemented using a variety of wireless communication equipment. Therefore, it is important to understand the communication tools available to user 110 before exploring the present invention. For example, in the case of a cellular telephone or other handheld wireless devices, the integrated data handling capabilities of the device play an important role in facilitating transactions between the transmitting and receiving devices.



**[0040]** FIG. 2 discloses an example of a modular layout for an apparatus usable with the present invention. WCD 100 is broken down into modules representing the functional aspects of the device. These functions may be performed by the various combinations of software and/or hardware components discussed below.

**[0041]** Control module 210 may regulate the operation of the apparatus. Inputs may be received from various other modules included within WCD 100. For example, interference sensing module 220 may use various techniques to detect any sources of environmental interference within transmission range of the apparatus. Control module 210 may interpret this data, and in response, may control other modules in WCD 100.

**[0042]** Communications module 230 may incorporate all of the communication aspects of WCD 100. As shown in FIG. 2, communications module 230 may include, for example, long-range communications module 232, short-range communications module 234 and close-proximity module 236. Communications module 230 may utilize one or more of these sub-modules to receive a multitude of different types of communication from both local and long distance sources, and to transmit data to recipient devices within the transmission range of WCD 100. Communications module 230 may be triggered by control module 210, or by control resources local to the module responding to sensed messages, environmental influences and/or other devices in proximity to WCD 100.

**[0043]** User interface module 240 may comprise visual, audible and tactile components (e.g., hardware and/or software) that allow user 110 to receive data from, and enter data into, the device. For instance, data entered by user 110 may be interpreted by control module 210 to affect the behavior of WCD 100. User-inputted data may also be transmitted by communications module 230 to other devices within effective transmission range. Other devices in transmission range may also send information to WCD 100 via communications module 230, and control module 210 may cause this information to be transferred to user interface module 240 for presentation to the user.

**[0044]** Applications module 250 may comprise other hardware and/or software applications on WCD 100. These applications may include sensors, interfaces, utilities, interpreters, data applications, etc., and may be invoked by control module 210 to read

information provided by the various modules, and in turn, may supply information to requesting modules in WCD 100.

**[0045]** In accordance with at least one embodiment of the present invention, FIG. 3 discloses an example of a structural layout usable in implementing the functionality of the modular system previously described with respect to FIG. 2. Processor 300 may control overall device operation. As shown in FIG. 3, processor 300 may be coupled to one or more communications sections 310, 320 and 340. Processor 300 may further be implemented utilizing one or more microprocessors that are each capable of executing software instructions stored in memory 330.

**[0046]** Memory 330 may include various types of random access memory (RAM), read only memory (ROM). Examples of usable memory types may include, for example, fixed computer readable media such electronic components and/or modules in stalled in the apparatus. Further, removable computer-readable medium on which computer executable code is embodied or recorded may be considered part of memory 330. Removable media may include electronic (e.g., Flash), magnetic (e.g., removable disks, drives, etc.), optical (e.g., CD-ROM, DVD, etc.) media, or any other technology that may be configured to store information in the form of data and software components (also referred to as modules). Data stored by memory 330 may be associated with particular software components. In addition, this data may be associated with databases, such as a bookmark database or a business database for scheduling, email, etc.

**[0047]** The software components stored by memory 330 include instructions that can be executed by processor 300. Various types of software components may be stored in memory 330. For instance, memory 330 may store software components that control the overall operation of WCD 100 (e.g., in the form of an operating system) and may also include more specialized software modules configured to manage particular functions such as communication sections 310, 320 and 340. Application-related software modules may also be stored in Memory 330. Examples of these software components may include a firewall, a service guide manager, a bookmark database, user interface manager, user-installed applications and communication utilities modules required to support WCD 100.

**[0048]** Long-range communications 310 may manage functionality related to the wireless exchange of information over large geographic areas (such as cellular networks) via an antenna. Communication transactions may be conducted using technologies from the previously described 1G to 3G. In addition to basic voice communication (e.g., via GSM), long-range communications 310 may operate to establish data communication sessions, such as General Packet Radio Service (GPRS) sessions and/or Universal Mobile Telecommunications System (UMTS) sessions. Also, long-range communications 310 may operate to transmit and receive messages, such as short messaging service (SMS) messages and/or multimedia messaging service (MMS) messages.

**[0049]** As a subset of long-range communications 310, or alternatively operating as an independent module separately connected to processor 300, transmission receiver 312 may allow WCD 100 to receive transmission messages via mediums such as Digital Video Broadcast for Handheld Devices (DVB-H). In at least one example scenario, transmissions may be encoded so that only certain receiving devices may access the transmission content, and may contain text, audio or video information. Further, WCD 100 may receive these transmissions and use information contained within the transmission signal to determine if the device is permitted to view the received content.

**[0050]** Short-range communications 320 is responsible for functions involving the exchange of information across short-range wireless networks. As described above and in FIG. 3, examples of wireless transports that may be categorized under short-range communications 320 are not limited to Bluetooth™, WLAN, UWB Ultra-Low Power Bluetooth™ (ULP-BT), wireless USB, Zigbee and Ultra High Frequency Radio Frequency communication (UHF RFID). Accordingly, short-range communications 320 performs functions related to the establishment of short-range connections, as well as processing related to the transmission and reception of information via such connections.

**[0051]** Close-proximity communications 340 may provide functionality related to the short-range scanning of machine-readable data. Near Field Communication, or NFC, apparatuses may be included in this category. For example, processor 300 may control components in close-proximity communication 340 to generate RF signals for activating an RFID transponder, and may in turn control the reception of signals from an RFID transponder.

Other short-range scanning methods for reading machine-readable data that may be supported by the close-proximity 340 are not limited to IR communication, linear and 2-D (e.g., QR) bar code readers (including processes related to interpreting UPC labels), and optical character recognition devices for reading magnetic, UV, conductive or other types of coded data that may be provided in a tag using suitable ink. To support the scanning of machine-readable data by close-proximity communications 340, WCD 100 may, for example, incorporate components such as optical detectors, magnetic detectors, CCDs or other sensors known in the art for interpreting machine-readable information.

**[0052]** As further shown in FIG. 3, user interface 350 may also be coupled to processor 300. User interface 350 facilitates the exchange of information with a user. The example of FIG. 3 discloses a user interface 350 that includes a user input 360 and a user output 370. User input 360 may include one or more components that allow user 110 to input information. Examples of such components include keypads, touch screens, and microphones. User output 370 allows a user to receive information from the device. Thus, user output portion 370 may include various components, such as a display, light emitting diodes (LED), tactile emitters and one or more audio speakers. Example displays include liquid crystal displays (LCDs), and other video displays.

**[0053]** WCD 100 may further include one or more transponders 380. A transponder may essentially comprise a passive device that may be programmed by processor 300 with information to be delivered in response to a scan from an outside source. For example, an RFID scanner mounted in an entryway may continuously emit radio frequency waves. When a person with a device containing transponder 380 walks through the door, the transponder may be energized, causing it to respond with information identifying the device, the person, etc. In addition, scanners can be mounted (e.g., as previously discussed with regard to examples of close-proximity communications 340) in WCD 100 so that it can read information from other transponders in the vicinity.

**[0054]** Hardware corresponding to communications sections 310, 312, 320 and 340 provide for the transmission and reception of signals. Accordingly, these portions may include components (e.g., electronics) that perform functions, such as modulation, demodulation, amplification, and filtering. These portions may be locally controlled, or controlled by processor

300 in accordance with software communication components stored in memory 330. The elements of FIG. 3 may further be constituted and/or coupled in accordance with various techniques in order to produce the functionality described in FIG. 2. In one example configuration, processor 300, communications sections 310, 312 and 320, memory 330, close-proximity communications 340, user interface 350, transponder 380, etc. may comprise separate components that are coupled together via one or more wired and/or wireless bus interfaces. Alternatively, any or all individual components may be replaced by integrated circuits in the form of a programmable logic device, gate array, ASIC, multi-chip module, etc. that may be programmed to replicate the functions of the stand-alone devices. In addition, each of these components may be coupled to a power source, such as a removable and/or rechargeable battery (not shown).

**[0055]** User interface 350 may allow user 110 to interact with various software components installed on the apparatus (e.g., contained in memory 330). The software components may, for example, provide functionality such as operating system modules, applications for productivity, entertainment, etc., communication utilities for supporting long-range communications 310, short-range communications 320, close-proximity communications 340, etc. Software components may include routines that, for example, may be configured to provide data processing, routing, transmission, reception, etc. Various programming mediums/languages may be used (Wireless Application (WAP), Hypertext Markup Language (HTML) variants like Compact HTML (CHTML), etc.)

III. Example operation of a wireless communication device including potential interference problems encountered.

**[0056]** FIG. 4 discloses an example of a process stack, in accordance with at least one embodiment of the present invention, for use in explaining operation of an apparatus. At the top level 400, user 110 interacts with WCD 100. This example involves user 110 entering information via user input 360 and receiving information from user output 370 in order to activate functionality in application level 410. In the application level, programs related to specific functionality within the device interact with both the user and the system level. These programs include applications for visual information (e.g., web browser, DVB-H receiver, etc.), audio information (e.g., cellular telephone, voice mail, conferencing software, DAB or analog

radio receiver, etc.), recording information (e.g., digital photography software, word processing, scheduling, etc.) or other information processing. Actions initiated in application level 410 may require information to be sent from, or received into, WCD 100. In FIG. 4, the transmission of data to a recipient apparatus via Bluetooth<sup>TM</sup> is being requested. As a result, application level 410 may then call resources in the system level to initiate the required processing and routing of data.

**[0057]** System level 420 may process and route data requests for transmission. Processing may include, for example, the calculation, translation, conversion and/or packetizing the data. The data may then be routed to an appropriate communication resource in the service level. If the desired communication resource is active and available in the service level 430, the packets may be routed to a radio modem for delivery via wireless transmission. In some configurations radio modems may comprise support hardware and/or software in addition to the actual modem component, and therefore, radio modems may interchangeably be referred to as radio modules herein. Apparatuses usable in implementing various embodiments of the present invention may include a plurality of these radio modules that are configured to operate using different wireless mediums. In FIG. 4, “modem 4” may be activated and able to send packets using Bluetooth<sup>TM</sup> communication. However, a radio module (as a hardware resource) need not be dedicated to a specific wireless medium, and may be used for different types of communication depending on the requirements of the wireless transport and the hardware characteristics of the radio modem or module.

**[0058]** FIG. 5 discloses a situation wherein the above described example operational process may cause more than one radio modem to become active. In this example, WCD 100 may both transmit and receive information via a multitude of transports in order to interact with various secondary devices such as those grouped at 500. For example, secondary devices may include cellular handsets communicating via long-range wireless communication like GSM, wireless headsets communicating via Bluetooth<sup>TM</sup>, Internet access points communicating via WLAN, etc.

**[0059]** Problems may occur when some or all of these communications occur simultaneously. As further shown in FIG. 5, multiple modems operating simultaneously may cause interference for each other. Such a situation may be encountered when WCD 100 is

communicating with more than one external device (as previously described). In an extreme example, devices simultaneously communicating via Bluetooth<sup>TM</sup>, WLAN and wireless USB would encounter substantial overlap since all of these wireless transports operate in the 2.4 GHz band. The interference, shown as an overlapping portion of the fields depicted in FIG. 5, would cause packets to be lost and the need for retransmission of these lost packets. Retransmission requires that future time slots be used to retransmit lost information, and therefore, overall communication performance will at least be reduced, if the signal is not lost completely. The present invention, in accordance with at least one embodiment, seeks to manage problematic situations where possibly conflicting communications may occur simultaneously so that interference is minimized or avoided, resulting in increased speed and Quality of Service (QoS).

#### IV. A wireless communication device including a multiradio controller.

**[0060]** In an attempt to better manage communication in WCD 100, a controller dedicated to managing wireless communication may be introduced. WCD 100, as shown in FIG. 6A, includes a multiradio controller (MRC) 600 in accordance with at least one embodiment of the present invention. MRC 600 may be coupled to the master control system of WCD 100, enabling MRC 600 to communicate with radio modems or other similar devices in communications modules 310 312, 320 and 340 within WCD 100.

**[0061]** FIG. 6B discloses in detail at least one embodiment of WCD 100, which may include multiradio controller (MRC) 600 introduced in FIG. 6A in accordance with at least one embodiment of the present invention. MRC 600 includes common interface 620 by which information may be sent or received through master control system 640. As set forth above, radio modems 610 and other devices 630 may also be referred to as “modules” in this disclosure as they may contain supporting hardware and/or software resources in addition to the modem itself. These resources may include control, interface and/or processing resources. Radio modems 610 or similar communication devices 630 (e.g., an RFID scanner for scanning machine-readable information) may include some sort of common interface 620 for communicating with master control system 640. As a result, all information, commands, etc. occurring between radio modems 610, similar devices 630 and MRC 600 are conveyed by the communication resources of master control system 640. The possible effect of sharing



communication resources with all the other functional modules within WCD 100 will be discussed with respect to FIG. 6C.

**[0062]** FIG. 6C discloses an operational diagram similar to FIG. 4 including the effect of MRC 600 in accordance with at least one embodiment of the present invention. In this system MRC 600 may receive operational data from the master operating system of WCD 100, concerning for example applications running in application level 410, and status data from the various radio communication devices in service level 430. MRC 600 may use this information to issue scheduling commands to the communication devices in service level 430 in an attempt to avoid communication problems. However, problems may occur when the operations of WCD 100 are fully employed. Since the various applications in application level 410, the operating system in system level 420, the communication devices in service level 430 and MRC 600 must all share the same communication system, delays may occur when all aspects of WCD 100 are trying to communicate on the common interface system 620. As a result, delay sensitive information regarding both communication resource status information and radio modem 610 control information may become delayed, nullifying any beneficial effect from MRC 600. Therefore, a system better able to handle the differentiation and routing of delay sensitive information is required if the beneficial effect of MRC 600 is to be realized.

#### V. A wireless communication device including a multiradio control system.

**[0063]** In accordance with at least one embodiment of the present invention, FIG. 7A introduces MRC 600 as part of multiradio control system (MCS) 700. MCS 700 may directly link communication resources in modules 310, 312, 320 and 340 to MRC 600. In this way, MCS 700 may be configured to provide a dedicated low-traffic communication structure for carrying delay sensitive information both to and from MRC 600.

**[0064]** Additional detail is shown in FIG. 7B. MCS 700 forms a direct link between MRC 600 and the communication resources of WCD 100. This link may be established by a system of dedicated MCS interfaces 710 and 760. For example, MCS interface 760 may be coupled to MRC 600. MCS Interfaces 710 may connect radio modems 610 and other similar communication devices 630 to MCS 700 in order to form an information conveyance for allowing delay sensitive information to travel to and from MRC 600. Therefore, MRC 600



operation may no longer be influenced by the processing load of master control system 640. As a result, any information still communicated by master control system 640 to and from MRC 600 may be deemed delay tolerant, and therefore, the actual arrival time of this information does not substantially influence system performance. On the other hand, all delay sensitive information is directed to MCS 700, and therefore is insulated from the loading of the master control system.

**[0065]** The effect of MCS 700 is seen in FIG. 7C in accordance with at least one embodiment of the present invention. Information may now be received in MRC 600 from at least two sources. System level 420 may continue to provide information to MRC 600 through master control system 640. In addition, service level 430 may specifically provide delay sensitive information conveyed by MCS 700. MRC 600 may distinguish between these two classes of information and act accordingly. Delay tolerant information may include information that typically does not change when a radio modem is actively engaged in communication, such as radio mode information (e.g., GPRS, Bluetooth<sup>TM</sup>, WLAN, etc.), priority information that may be defined by user settings, the specific service the radio is driving (QoS, real time/non real time), etc. Since delay tolerant information changes infrequently, it may be delivered in due course by master control system 640 of WCD 100. Alternatively, delay sensitive (or time sensitive) information includes at least modem operational information that frequently changes during the course of a wireless connection, and therefore, requires immediate update. As a result, delay sensitive information may need to be delivered directly from the plurality of radio modems 610 through the MCS interfaces 710 and 760 to MRC 600, and may include radio modem synchronization information. Delay sensitive information may be provided in response to requests by MRC 600, or may be delivered as a result of a change in radio modem settings during transmission as discussed below with respect to synchronization.

VI. A wireless communication device including a distributed multiradio control system.

**[0066]** FIG. 8A discloses an alternative configuration in accordance with at least one embodiment of the present invention, wherein a distributed multiradio control system (MCS) 700 is introduced into WCD 100. Distributed MCS 700 may, in some cases, be deemed to provide an advantage over a centralized MRC 600 by distributing these control features into already necessary components within WCD 100. As a result, a substantial amount of the communication

management operations may be localized to the various communication resources, such as radio modems (modules) 610, reducing the overall amount of control command traffic in WCD 100.

**[0067]** MCS 700, in this example, may be implemented utilizing a variety of bus structures, including the I<sup>2</sup>C interface commonly found in portable electronic devices, as well as emerging standards such as SLIMbus that are now under development. I<sup>2</sup>C is a multi-master bus, wherein multiple devices can be connected to the same bus and each one can act as a master through initiating a data transfer. An I<sup>2</sup>C bus contains at least two communication lines, an information line and a clock line. When an apparatus has data to transmit, it assumes a master role and transmits both its clock signal and information to a recipient device. On the other hand, SLIMbus uses a separate, non-differential physical layer that runs at rates of 50 Mbits/s or slower over just one lane. It is being developed by the Mobile Industry Processor Interface (MIPI) Alliance to replace today's I<sup>2</sup>C and I<sup>2</sup>S interfaces while offering more features and requiring the same or less power than the two combined.

**[0068]** MCS 700 directly links distributed control components 702 in modules 310, 312, 320 and 340. Another distributed control component 704 may reside in master control system 640 of WCD 100. It is important to note that distributed control component 704 shown in processor 300 is not limited only to the disclosed embodiment, and may reside in any appropriate system module within WCD 100. The addition of MCS 700 provides a dedicated low-traffic communication structure for carrying delay sensitive information both to and from the various distributed control components 702.

**[0069]** The example configuration disclosed in FIG. 8A is described further with respect to FIG. 8B. MCS 700 forms a direct link between distributed control components 702 within WCD 100. Distributed control components 702 in radio modems 610 (together forming a "module") may, for example, consist of MCS interface 710, radio activity controller 720 and synchronizer 730. Radio activity controller 720 uses MCS interface 710 to communicate with distributed control components in other radio modems 610. Synchronizer 730 may be utilized to obtain timing information from radio modem 610 to satisfy synchronization requests from any of the distributed control components 702. Radio activity controller 702 may also obtain information from master control system 640 (e.g., from distributed control component 704) through common interface 620. As a result, any information communicated by master control

system 640 to radio activity controller 720 through common interface 620 may be deemed delay tolerant, and therefore, the actual arrival time of this information does not substantially influence communication system performance. On the other hand, all delay sensitive information may be conveyed by MCS 700, and therefore is insulated from master control system overloading.

**[0070]** As previously stated, distributed control component 704 may exist within master control system 640. Some aspects of this component may reside in processor 300 as, for example, a running software routine that monitors and coordinates the behavior of radio activity controllers 720. Processor 300 is shown to contain priority controller 740. Priority controller 740 may be utilized to monitor active radio modems 610 in order to determine priority amongst these devices. Priority may be determined by rules and/or conditions stored in priority controller 740. Modems that become active may request priority information from priority controller 740. Further, modems that go inactive may notify priority controller 740 so that the relative priority of the remaining active radio modems 610 may be adjusted accordingly. Priority information is usually not considered delay sensitive because it is mainly updated when radio modems 610 activate/deactivate, and therefore, does not frequently change during the course of an active communication connection in radio modems 610. In various embodiments of the present invention, this information may be conveyed to radio modems 610 using common interface system 620.

**[0071]** At least one impact of a distributed control MCS 700 is seen in FIG. 8C. System level 420 may continue to provide delay tolerant information to distributed control components 702 through master control system 640. In addition, distributed control components 702 in service level 430, such as modem activity controllers 720, may exchange delay sensitive information with each other via MCS 700. Each distributed control component 702 may distinguish between these two classes of information and act accordingly. Delay tolerant information may include information that typically does not change when a radio modem is actively engaged in communication, such as radio mode information (e.g., GPRS, Bluetooth<sup>TM</sup>, WLAN, etc.), priority information that may be defined by user settings, the specific service the radio is driving (QoS, real time/non real time), etc. Since delay tolerant information changes infrequently, it may be delivered in due course by master control system 640 of WCD 100. Alternatively, delay sensitive (or time sensitive) information may include at least modem

operational information that frequently changes during the course of a wireless connection, and therefore, requires immediate update. Delay sensitive information needs to be delivered directly between distributed control components 702, and may include radio modem synchronization and activity control information. Delay sensitive information may be provided in response to a request, or may be delivered as a result of a change in radio modem, which will be discussed with respect to synchronization below.

**[0072]** MCS interface 710 may be used to (1) Exchange synchronization information, and (2) Transmit identification or prioritization information between various radio activity controllers 720. In addition, as previously stated, MCS interface 710 may be utilized for communicating the radio parameters that are delay sensitive from a controlling point of view. MCS interface 710 can be shared between different radio modems (multipoint) but it cannot be shared with any other functionality that could limit the usage of MCS interface 710 from a latency point of view.

**[0073]** The control signals sent on MCS 700 that may enable/disable a radio modem 610 should be based upon a modem's periodic events. Each radio activity controller 720 may obtain this information about a radio modem's periodic events from synchronizer 730. This kind of event can be, for example, frame clock event in GSM (4.615 ms), slot clock event in Bluetooth<sup>TM</sup> (625 us) or targeted beacon transmission time in WLAN (100 ms) or any multiple of these. A radio modem 610 may send its synchronization indications when (1) Any radio activity controller 720 requests it, (2) a radio modem internal time reference is changed (e.g. due to handover or handoff). The latency requirement for the synchronization signal is not critical as long as the delay is constant within a few microseconds. The fixed delays can be taken into account in the scheduling logic of radio activity controller 710.

**[0074]** For predictive wireless communication mediums, the radio modem activity control may be based on the knowledge of when the active radio modems 610 are about to transmit (or receive) in the specific connection mode in which the radios are currently operating. The connection mode of each radio modem 610 may be mapped to the time domain operation in their respective radio activity controller 720. As an example, for a GSM speech connection, priority controller 740 may have knowledge about all traffic patterns of GSM. This information may be transferred to the appropriate radio activity controller 720 when radio modem 610

becomes active, which may then recognize that the speech connection in GSM includes one transmission slot of length 577  $\mu$ s, followed by an empty slot after which is the reception slot of 577  $\mu$ s, two empty slots, monitoring (RX on), two empty slots, and then it repeats. Dual transfer mode means two transmission slots, empty slot, reception slot, empty slot, monitoring and two empty slots. When all traffic patterns that are known a priori by the radio activity controller 720, it only needs to know when the transmission slot occurs in time to gain knowledge of when the GSM radio modem is active. This information may be obtained by synchronizer 730. When the active radio modem 610 is about to transmit (or receive) it must check every time whether the modem activity control signal from its respective radio activity controller 720 permits the communication. Radio activity controller 720 is always either allowing or disabling the transmission of one full radio transmission block (e.g. GSM slot).

#### VII. An example of an alternative distributed multiradio control system.

**[0075]** An alternative distributed control configuration, in accordance with at least one embodiment of the present invention, is disclosed in FIG. 9A-9C. In FIG. 9A, distributed control components 702 continue to be linked by MCS 700. However, now distributed control component 704 may also be directly coupled to distributed control components 702 via an MCS interface. As a result, distributed control component 704 may also utilize and benefit from MCS 700 for transactions involving the various communication components of WCD 100.

**[0076]** Referring now to FIG. 9B, the inclusion of distributed control component 704 onto MCS 700 is shown in more detail. Distributed control component 704 includes at least priority controller 740 coupled to MCS interface 750. MCS interface 750 may allow priority controller 740 to send information to, and receive information from, radio activity controllers 720 via a low-traffic connection dedicated to the coordination of communication resources in WCD 100. As previously stated, the information provided by priority controller 740 may not be deemed delay sensitive information, however, the provision of priority information to radio activity controllers 720 via MCS 700 may improve the overall communication efficiency of WCD 100. Performance may improve because quicker communication between distributed control components 702 and 704 may result in faster relative priority resolution in radio activity controllers 720. Further, common interface system 620 of WCD 100 may be relieved of having to accommodate communication traffic from distributed control component 704, reducing the

overall communication load in master control system 640. Another benefit may be realized in communication control flexibility in WCD 100. New features may be introduced into priority controller 740 without worrying about whether the messaging between control components will be delay tolerant or sensitive because an MCS interface 710 is already available at this location.

**[0077]** FIG. 9C discloses possible operational effects on communication in WCD 100 in view of the enhancements implemented in the current alternative embodiment of the present invention. The addition of an alternative route for radio modem control information to flow between distributed control components 702 and 704 may both improve the communication management of radio activity controllers 720 and lessen the burden on master control system 640. In this embodiment, all distributed control components of MCS 700 are linked by a dedicated control interface, which provides immunity to communication coordination control messaging in WCD 100 when the master control system 640 is experiencing elevated transactional demands.

**[0078]** An example message packet 900, in accordance with various embodiments of the present invention, is disclosed in FIG. 10. Message packet 900 may include, for example, activity pattern information that may be formulated by MRC 600 or radio activity controller 720. An example data payload of packet 900 may include at least Message ID information, allowed/disallowed transmission (Tx) period information, allowed/disallowed reception (Rx) period information, Tx/Rx periodicity (how often the Tx/Rx activities contained in the period information occur), and validity information describing when the activity pattern becomes valid and whether the new activity pattern is replacing or added to the existing one. The data payload of packet 900, as shown, may consist of multiple allowed/disallowed periods for transmission or reception (e.g., Tx period 1, 2...) each containing at least a period start time and a period end time during which radio modem 610 may either be permitted or prevented from executing a communication activity. While the distributed example of MCS 700 may allow radio modem control activity to be controlled real-time (e.g., more control messages with finer granularity), the ability to include multiple allowed/disallowed periods into a single message packet 900 may support radio activity controllers 720 in scheduling radio modem behavior for longer periods of time, which may result in a reduction in message traffic. Further, changes in radio modem 610 activity patterns may be amended using the validity information in each message packet 900.

**[0079]** The modem activity control signal (e.g., packet 900) may be formulated by MRC 600 or radio activity controller 720 and transmitted on MCS 700. The signal includes activity periods for Tx and Rx separately, and the periodicity of the activity for the radio modem 610. While the native radio modem clock is the controlling time domain (never overwritten), the time reference utilized in synchronizing the activity periods to current radio modem operation may be based on one of at least two standards. In a first example, a transmission period may start after a pre-defined amount of synchronization events have occurred in radio modem 610. Alternatively, all timing for MRC 600 or between distributed control components 702 may be standardized around the system clock for WCD 100. Advantages and disadvantages exist for both solutions. Using a defined number of modem synchronization events is beneficial because then all timing is closely aligned with the radio modem clock. However, this strategy may be more complicated to implement than basing timing on the system clock. On the other hand, while timing based on the system clock may be easier to implement as a standard, conversion to modem clock timing must necessarily be implemented whenever a new activity pattern is installed in radio modem 610.

**[0080]** The activity period may be indicated as start and stop times. If there is only one active connection, or if there is no need to schedule the active connections, the modem activity control signal may be set always on allowing the radio modems to operate without restriction. The radio modem 610 should check whether the transmission or reception is allowed before attempting actual communication. The activity end time can be used to check the synchronization. Once the radio modem 610 has ended the transaction (slot/packet/burst), it can check whether the activity signal is still set (it should be due to margins). If this is not the case, the radio modem 610 can initiate a new synchronization with MRC 600 or with radio activity controller 720 through synchronizer 730. The same thing may happen if a radio modem time reference or connection mode changes. A problem may occur if radio activity controller 720 runs out of the modem synchronization and starts to apply modem transmission/reception restrictions at the wrong time. Due to this, modem synchronization signals need to be updated periodically. The more active wireless connections, the more accuracy is required in synchronization information.



### VIII. Radio modem interface to other devices.

**[0081]** As a part of information acquisition services, MCS interface 710 may need to send information to MRC 600 (or radio activity controllers 720) about periodic events of the radio modems 610. Using its MCS interface 710, the radio modem 610 may indicate a time instance of a periodic event related to its operation. In practice these instances may include times when radio modem 610 is active and may be preparing to communicate or communicating. Events occurring prior to or during a transmission or reception mode may be used as a time reference (e.g., in case of GSM, the frame edge may be indicated in a modem that is not necessarily transmitting or receiving at that moment, but we know based on the frame clock that the modem is going to transmit [x]ms after the frame clock edge). Basic principle for such timing indications is that the event is periodic in nature. Every incident needs not to be indicated, but the MRC 600 may calculate intermediate incidents itself. In order for that to be possible, the controller may also require other relevant information about the event, e.g. periodicity and duration. This information may be either embedded in the indication or the controller may get it by other means. Most importantly, timing indications need to be such that the controller can acquire a radio modem's basic periodicity and timing. The timing of an event may either be in the indication itself, or it may be implicitly defined from the indication information by MRC 600 (or radio activity controller 720).

**[0082]** In general terms these timing indications need to be provided on periodic events like: schedule broadcasts from a base station (typically TDMA/MAC frame boundaries) and own periodic transmission or reception periods (typically Tx/Rx slots). Those notifications need to be issued by the radio modem 610: (1) on network entry (i.e. modem acquires network synchrony), (2) on periodic event timing change e.g. due to a handoff or handover and (3) as per the policy and configuration settings in the multiradio controller (monolithic or distributed).

**[0083]** In at least one embodiment of the present invention, various messages that are exchanged between the aforementioned communication components in WCD 100 may be used to dictate behavior on both a local (radio modem level) and global (WCD level) basis. MRC 600 or radio activity controller 720 may deliver a schedule to radio modem 610 with the intent of controlling that specific modem, however, radio modem 610 may not be compelled to conform to this schedule. The basic principle is that radio modem 610 is not only operating according to



multiradio control information (e.g., operates only when MRC 600 allows) but is also performing internal scheduling and link adaptation while taking MRC scheduling information into account.

#### IX. Example software-defined radio (SDR) module.

**[0084]** The various examples of multiradio control implementation disclosed herein have been explained utilizing only hardware-based radio modules. A hardware-based radio module may be, for example, a radio module that relies primarily upon hardware components and static software elements (e.g., hard-coding or rewritable code that does not change during operation) for establishing communication. However, in accordance with at least one embodiment of the present invention, one or more transports may be supported in an apparatus by radio modules that rely more heavily upon a reconfigurable software-based element. The software-based element may be reconfigured at runtime, and therefore, these radio modules may be reconfigured to emulate various functionality that was traditionally only available through discrete modules.

**[0085]** In general, software-based elements may be implemented using known software tools (e.g., languages, compiled code, etc.) to establish instruction sets (e.g., programs, modules, etc.) that are executable by a processor. The functionality of a hardware-based component, or one or more elements of a hardware-based component, may be “defined” in terms of a set of instructions or conditions that exist within a program or module. Programs may be stored, for example, in a static or dynamic memory within an apparatus. When executed by a processor, these programs may access, manipulate, configure, etc. hardware elements in the apparatus in order to create the desired functionality. Examples of memory may include fixed or removable computer-readable media in a variety of formats (e.g., magnetic, optical, electronic, etc.).

**[0086]** An example implementation of a software-defined radio (SDR) module usable in accordance with various embodiments of the present invention is disclosed in FIG. 11. Initially, a partial representation of an example WCD 100, such, for example, as previously described herein with respect to various multiradio implementation examples, is shown at 1100. In this example, WCD 100 may employ distinct hardware-based communication modules corresponding to, for example, long-range communications 310, broadcast receivers 312 and short-range communications 320. However, the configuration of multiradio systems is not specifically limited to the structure shown at 1100.

**[0087]** For example, an alternative communication configuration for WCD 100 is shown at 1102. In this example, the apparatus may incorporate at least one SDR module 1104 in lieu of one or more discrete hardware-based radio modules. While the flexibility of SDR module 1104 may provide an option of omitting some communication hardware from WCD 100, this does not preclude the incorporation of one or more hardware-based modules 1106. Implementations incorporating both SDR radio modules 1104 and hardware-based modules 1106 (represented as optional in FIG. 11 through the use of dotted lines) are possible. Combined hardware-based and software-based technology implementations may be employed, for example, in situations where specialized hardware is required to support particular transports, it is more economical to implement a hardware-based solution for a particular transport, an SDR module 1102 and a hardware-based module 1106 are used to support transports that often operate concurrently (e.g., transports that do not interfere with each other, and therefore, can operate at the same time), etc.

**[0088]** Now referring to FIG. 12, a more detailed example of a SDR module is disclosed in accordance with at least one embodiment of the present invention. “Radio computers,” which fall within the broader software-defined radio (SDR) concept, include platform architectures in which the different radio systems are loaded as software (e.g., as radio programs) and in which as single HW/SW platform can be used to implement different wireless connectivity features on shared processing resources. The radio programs may serve the purpose of cellular communication, local connectivity, broadcast, navigation, etc., and they can be integrated into legacy (existing) radio systems or form totally new radios. Further, “cognitive” radios include the ability to sense the surrounding environment and to share this information with peers. The sensed information may be utilized, for example, in distributed sensing strategies that allow apparatuses to make localized decisions in view of the entire environment when configuring communication.

**[0089]** FIG. 12 explains an example of a possible implementation of a SDR 1102 utilizing a previously disclosed embodiment of the present invention. SDR 1102 may interact with multiradio control features (e.g., MRC 600) via MCS 700 and/or via common interfaces that may be components of master control system 640. For example, SDR 1102 may include a multiradio access interface 1108 configured for the transmission and reception of delay-sensitive information via MCS 700. In addition, flow controller 1112 in SDR 1102 may interact with

programs in master control system 640 in order to regulate the flow of messages being sent from, and being received into, SDR 1102. Multiradio access interface 1108 and flow controller 1112 may interact with various software components within SDR 1102 to emulate various hardware-based radio modules.

**[0090]** For example, information received via the aforementioned interfaces may be used to determine how SDR 1102 is to be configured. As part of this configuration, radio connection manager 1110 may receive data from multiradio access interface 1108 and/or flow controller 1112. This data may include at least one of instruction information (e.g., rules or preferences regarding which transports to utilize in certain situations) and messages awaiting transmission. Radio connection manager 1110 may then interact with some or all of configuration manager 1114, local multiradio control 1116 and resource manager 1118 in order to configure SDR 1102. For instance, configuration manager 1114 may provide information regarding resources required for supporting a particular wireless transport, and resource manager 1118 may determine if these resources are available. If radio connection manager 1110 decides that it is possible to configure SDR 1102 to support the particular wireless transport (e.g., in view of the information provided by the other modules) then local multiradio control 1116 may implement the configuration. While an example of a usable configuration for SDR 1102 has been disclosed in FIG. 12, other configurations are also possible in accordance with various embodiments of the present invention. For example, in an alternate configuration the functionality of MRC 600 and local multiradio controller 1116 may be implemented as a single functional element in WCD 100.

**[0091]** In implementing a particular radio configuration, some or all of software modules 1110-1118 may interact with unified radio system interface 1120 in order to establish settings that will allow SDR 1102 to emulate a desired radio functionality. For example, unified radio systems may include both protocol information 1122 and device information 1124 that may be usable when replicating the functionality of hardware-based radios. The configured software resources may then access hardware resources (e.g., antennas 1126) to send and/or receive wireless messages. For example, information in protocols 1122 and devices 1124 may be accessed and/or manipulated in order to emulate the functionality of a radio module that is configured to operate using a first transport (e.g., Bluetooth<sup>TM</sup> (BT)), and at the conclusion of activity may be reconfigured to support other communication in WCD 100 (e.g., WLAN).

**[0092]** In addition, it may be possible for SDR module 1108 to have cognitive features. Characteristics like apparatus status (e.g., process load, pending messages, power condition, etc.) and the environment proximate to an apparatus may be utilized to configure SDR module 1102. For example, resources in SDR module 1102, another radio module, or elsewhere in WCD 100 may be able to identify signals that could potentially interfere with apparatus communication. The identification of signal interference may be provided from sensor information (e.g., a sensor may detect a signal in proximity to an apparatus) and/or may be identified through information that is already “known” to WCD 100. For example, MRC 600 may schedule communication in a multiradio system, and therefore, some or all of the schedule information may be provided to, or accessed by, SDR module 1102. Regardless of the source, information on potential interference signals may be utilized when determining the optimum configuration for SDR module 1102.

**[0093]** In accordance with various embodiments of the present invention, SDR module 1102 may interact with various program modules 1128 residing in at least one of MRC 600 or master control system 640. Program modules 1128 may provide apparatus side coordination of communication when, for example, multiple SDR modules 1102 are active, or when SDR module 1102 is active at the same time as a hardware-based radio module. Example program modules that may exist within program modules 1128 include, but are not limited to, mobility policy manager 1130, networking stack 1120 and administrator 1134. In at least one scenario, mobility policy manager 1130 may define preferences and/or rules that control utilization of transports in an apparatus (e.g., WCD 100). These preferences and/or rules may be based on various apparatus, application or user-defined characteristics. For example, the number of messages pending for each transport in networking stack 1132 may determine the next transport that will be implemented (e.g., a priority between the active transports), and therefore, the next configuration for SDR module 1102. In making this determination, mobility policy manager 1130 may work with administrator 1134 to create an appropriate implementation schedule so that communication may continue within the guidelines set forth in the preferences and/or rules.

#### X. Example configuration methodology for SDR modules

**[0094]** As generally set forth above, an apparatus may utilize a variety of characteristic information when determining how to configure a SDR module 1102. However, characteristic information pertaining only to the apparatus itself may not address all issues that could

potentially influence a transaction (e.g., including characteristics that may exist in one or more apparatuses with which communication is desired). In accordance with various embodiments of the present invention, conditions that exist in or around other apparatuses participating in wireless communication may, in some instances, alter the determination process with respect to configuring SDR module 1102.

**[0095]** FIG. 13 discloses an example including two apparatuses. While FIG. 13 discloses a scenario where a first apparatus desires to establish wireless communication (e.g., a wireless link) with a second apparatus, this example is presented herein only for the sake of explanation. As such, the present invention is not limited only to the disclosed interaction (e.g., may involve more than two apparatuses) or any particular wired or wireless transports. Further, while various implementations of the present invention have been described herein as integrated with a multiradio control system, various embodiments of the present invention may also operate in standalone situations (e.g., configurations where no multiradio control has been established).

**[0096]** In this non-limiting example, apparatus A 1300 has a requirement to interact with apparatus B 1302 in FIG. 13. Such a requirement to establish communication may be initiated by, for example, applications and/or utilities executing on apparatus A 1300, user interaction with apparatus A 1300, etc. In response to this requirement, apparatus A 1300 may send a wireless inquiry to apparatus B 1302. The wireless inquiry may be sent, for example, utilizing a channel (e.g., an initialization channel) that is known to (e.g., predefined or predetermined) each apparatus. Apparatus B 1302 may acknowledge receipt of the inquiry from apparatus A 1300, and may in turn respond with one or more messages accepting the invitation to communicate and containing remote characteristics. Remote characteristics comprise information related to the apparatus with which communication is desired (e.g., apparatus B 1302), and may include information regarding apparatus status and/or environmental conditions proximate to the apparatus. For instance, apparatus status information may include apparatus communication capabilities and/or preferences, current apparatus power condition, current apparatus operational condition, current communication activity including transports active in the apparatus and a number of messages pending for each active transport, etc. Information pertaining to environmental conditions may include signals sensed in proximity to the apparatus that may potentially cause interference, communication scheduled in the apparatus, the identification of

other apparatuses operating in proximity, etc. Some or all of this information may be provided in response to the inquiry of apparatus A 1300.

**[0097]** Apparatus A 1300 may also determine characteristics pertaining to itself, which are designated local characteristics in FIG. 13. Local characteristics may include all of the information discussed above with respect to remote characteristics, but from the perspective of the initiating apparatus. While local characteristics are formulated after remote characteristics in the example of FIG. 13, the determination of local characteristics is not limited to this temporal organization. In particular, the determination of local characteristics may occur before, during or after the receipt of remote characteristics from apparatus B 1302. Once Apparatus A 1300 has both the remote and local characteristic information, a configuration for SDR module 1102 may be formulated. The configuration may define a transport, or a list of transports (e.g., in priority order), for use in communication with apparatus B 1302, channel selection for each transport (e.g., hopping patterns), error correction, Quality of Service (QoS) requirements, operational schemes (e.g., power saving, high speed, etc.), radio module priority (for conflict resolution), etc.

**[0098]** After formulation of the configuration is complete, the configuration may be sent to apparatus B 1302. In various embodiments of the present invention, the configuration may be sent to apparatus B 1302 on the initialization channel. Apparatus A 1300 and apparatus B 1302 may then set the configuration. Setting a configuration may include, for example, programming one or more SDR modules 1102 in each apparatus for establishing communication in accordance with the configuration. After the configuration is set in apparatus A 1300 and apparatus B 1302, either apparatus may initiate communication (e.g., establish a wireless link between apparatuses).

**[0099]** It is important to note that, in various embodiments of the present invention, the communication may continue in accordance with the existing configuration until an event occurs that would necessitate a new configuration. Examples of events that may necessitate a new configuration may include, but are not limited to, fulfillment of the communication requirement, a loss of wireless connection between the apparatuses, sensed interference in proximity to either apparatus, a higher priority communication in one or both of the apparatuses that could conflict with current communication, a status change in either apparatus (e.g., power depletion), etc.



**[00100]** A flowchart of an example configuration process in accordance with at least one embodiment of the present invention is disclosed in FIG. 14A. The process may begin in step 1400 with the realization of a communication requirement in an apparatus. A determination may then be made in step 1402 as to whether any other apparatuses that can fulfill the requirement are within communication range of the apparatus. If no other apparatuses are discovered, then in step 1404 the process may enter a failure mode, wherein the failure mode may include one or more activities executed when the requirement cannot be fulfilled. Activities may include, for example, a visible, audible or tactile notification of communication failure to an apparatus user. The process may then return to step 1400 to await subsequent requirements for communication.

**[00101]** If at least one other apparatus that can fulfill the communication requirement is detected within range of the apparatus, then in step 1406 a connection request may be sent to the other apparatus. Connection requests may be sent on a channel known to both apparatuses (e.g., an initialization channel). If no response is received from the other apparatus in step 1408, then in step 1410 a determination may be made as to whether a retry condition has been exceeded. Examples of retry conditions include a duration of time since the original connection attempt, a number of retries, etc. Connection requests may continue in step 1406 until the retry condition is exceeded (step 1410), at which point the failure mode described in step 1404 may be triggered.

**[00102]** If the other apparatus acknowledges the connection request, then in step 1412 an inquiry may be sent to the other apparatus. The inquiry may request, or trigger the provision of, remote characteristic information from the other apparatus. If remote characteristic information is not received in step 1414, then a determination may be made in step 1408 as to whether the wireless connection was lost. If a response is received in step 1414 (e.g., including remote characteristics pertaining to the other apparatus), then in step 1416 local characteristics related to the initiating apparatus may be determined. As stated above, steps 1414 and 1416 do not have to occur in the order depicted in FIG. 14A, as the determination of local characteristics may occur in the initiating apparatus before, during or after the receipt of the remote characteristics.

**[00103]** The initiating apparatus may then formulate a configuration based on at least the remote characteristic information and the local characteristic information in step 1418. The completed configuration may, for example, allow an apparatus to program one or more SDR modules 1102 for wireless communication. The configuration may then be sent to the other

apparatus in step 1420. In accordance with at least one embodiment of the present invention, the configuration may be sent from the initiating apparatus to the other apparatus on the initialization channel. For example, the configuration may be set in the initiating apparatus (step 1422) by ceasing interaction with the other apparatus on the initialization channel, and then programming one or more SDR modules 1102 to communicate in accordance with the configuration.

**[00104]** In step 1424 the connection defined by the configuration may be established. The connection may be, for example, a wireless link on a channel different than the initialization channel, or even via a totally different wireless transport. If a connection fails to be established, as determined in step 1426, then the process may return to step 1402 to determine if the other apparatus can still be detected. For example, the other apparatus originally discovered in step 1402 may have moved outside of the range of the wireless transport configured in step 1422 by the time a connection is attempted in step 1424. If the connection (e.g., wireless link) defined by the configuration is established in step 1426, the connection may continue in step 1428 until an event occurs that would necessitate the formulation of a new configuration. For example, completion of the current communication requirement, an interference signal sensed in proximity to one or both apparatuses, a higher priority communication in one of the apparatuses, etc. may be considered events that would cause the process to return to step 1400 in preparation for the formulation of a new configuration based on, for example, a new communication requirement.

**[00105]** A flowchart depicting an example process for establishing a wireless connection from the perspective of an apparatus that is receiving the initial inquiry, in accordance with at least one embodiment of the present invention, is now disclosed with respect to FIG. 14B. Initially, a wireless communication may be received by an apparatus (e.g., apparatus B 1302) in step 1450. A determination may then be made in step 1452 as to whether the communication comprises an inquiry requesting characteristic information from the receiving apparatus. If no characteristic information is requested, then in step 1454 a link may be negotiated in accordance with standard communication methodology (e.g., based on the protocol for the wireless transport that is currently being utilized), which may be followed by link establishment in step 1456.

**[00106]** If in step 1452 a determination is made that a characteristic information inquiry is present in the received communication, then the receiving apparatus may formulate characteristic information concerning itself (e.g., in accordance with the various examples presented herein).



While characteristic information formulation is shown as step 1458 in the FIG. 14B process, the formulation of characteristic information is not strictly limited to this instance. The formulation of characteristic information may also occur before receiving the inquiry, periodically, etc. A response may then be sent to the inquiring apparatus in step 1460, the response comprising at least the characteristic information. The receiving device may then enter a waiting loop in steps 1462 and 1464. For example, the receiving apparatus may wait for a configuration from the initiating apparatus until a condition is exceeded (e.g., until a duration from the time that the characteristic information response was sent, until a number of retry transmissions has been exceeded, etc.). In the example of a retry limit condition, the receiving apparatus may attempt to resend the characteristic information response in order to ensure that this information was successfully received. If no configuration is received, and the condition is exceeded in step 1464, then in step 1466 an error condition may commence. Examples of activities that may be executed in an error condition may include, for example, displaying notification to a user that no configuration was received, reformulating and retransmitting the characteristic information to the initiating apparatus, verification of the presence of the initiating apparatus, etc. The process may then restart in step 1450 with the receiving apparatus awaiting further communication.

**[00107]** If in step 1462 a communication configuration is received from the initiating apparatus, then in step 1468 the received communication configuration may be implemented in the receiving apparatus. Implementation of the configuration in the receiving apparatus may include, for example, the configuration of a hardware-based radio module (or alternatively of a SDR module enabled to emulate hardware-based radio functionality) to communicate utilizing particular wireless transports, particular channels or certain features/modes (e.g., error checking, power saving, etc.). A link in accordance with the received communication configuration may then be established in step 1456. After the communication transaction is completed, the process may again reinitiate in step 1450, wherein the receiving apparatus awaits further communication.

**[00108]** Accordingly, it will be apparent to persons skilled in the relevant art that various changes in form and detail can be made therein without departing from the spirit and scope of the invention. The breadth and scope of the present invention should not be limited by any of the above-described example embodiments, but should be defined only in accordance with the following claims and their equivalents.

WHAT IS CLAIMED:

1. A method, comprising:
  - initiating an inquiry from an apparatus to at least one other apparatus;
  - receiving remote characteristic information into the apparatus, the remote characteristic information corresponding to the at least one other apparatus;
  - determining local characteristic information in the apparatus;
  - formulating a configuration in the apparatus, the configuration being based on the remote characteristic information and the local characteristic information;
  - sending the configuration from the apparatus to the at least one other apparatus;
  - implementing the configuration in the apparatus; and
  - establishing communication between the apparatus and at least one other apparatus in accordance with the configuration.
2. The method of claim 1, wherein the inquiry is conducted via an initialization channel that is established in both the apparatus and the at least one other apparatus.
3. The method of claim 1, wherein remote characteristic information comprises at least one of supported communication transport configuration information for the at least one other apparatus, power status information for the at least one other apparatus, processing load information for the at least one other apparatus, communication load information for the at least one other apparatus, proximate interference information for the at least one other apparatus, and user preferences configured in the at least one other apparatus.
4. The method of claim 1, wherein local characteristic information comprises at least one of supported communication transport configuration information for the apparatus, power status information for the apparatus, processing load information for the apparatus, communication load information for the apparatus, proximate interference information for the apparatus, and user preferences configured in the apparatus.

5. The method of claim 1, wherein the configuration comprises at least information that is required by the apparatus and the at least one other apparatus in order to establish communication via a wireless transport, the wireless transport being determined based on the remote characteristic information and the local characteristic information.
6. The method of claim 1, wherein the configuration is sent via an initialization channel that is established in both the apparatus and the at least one other apparatus, the at least one other apparatus implementing the configuration that was sent from the apparatus.
7. The method of claim 1, wherein implementing the configuration comprises discontinuing communication occurring on an initialization channel and resetting resources in the apparatus and the at least one other apparatus in accordance with the configuration.
8. The method of claim 1, wherein the communication between the apparatus and the at least one other apparatus is established via a wireless transport that is different from the wireless transport utilized to transmit the inquiry from the apparatus.
9. A computer program product comprising computer executable program code recorded on a computer readable medium, the computer executable program code comprising:
  - computer program code configured to initiate an inquiry from an apparatus to at least one other apparatus;
  - computer program code configured to receive remote characteristic information into the apparatus, the remote characteristic information corresponding to the at least one other apparatus;
  - computer program code configured to determine local characteristic information in the apparatus;
  - computer program code configured to formulate a configuration in the apparatus, the configuration being based on the remote characteristic information and the local characteristic information;

computer program code configured to send the configuration from the apparatus to the at least one other apparatus;

computer program code configured to implement the configuration in the apparatus; and

computer program code configured to establish communication between the apparatus and at least one other apparatus in accordance with the configuration.

10. The computer program product of claim 9, wherein the inquiry is conducted via an initialization channel that is established in both the apparatus and the at least one other apparatus.
11. The computer program product of claim 9, wherein remote characteristic information comprises at least one of supported communication transport configuration information for the at least one other apparatus, power status information for the at least one other apparatus, processing load information for the at least one other apparatus, communication load information for the at least one other apparatus, proximate interference information for the at least one other apparatus, and user preferences configured in the at least one other apparatus.
12. The computer program product of claim 9, wherein local characteristic information comprises at least one of supported communication transport configuration information for the apparatus, power status information for the apparatus, processing load information for the apparatus, communication load information for the apparatus, proximate interference information for the apparatus, and user preferences configured in the apparatus.
13. The computer program product of claim 9, wherein the configuration comprises at least information that is required by the apparatus and the at least one other apparatus in order to establish communication via a wireless transport, the wireless transport being

determined based on the remote characteristic information and the local characteristic information.

14. The computer program product of claim 9, wherein the configuration is sent via an initialization channel that is established in both the apparatus and the at least one other apparatus, the at least one other apparatus implementing the configuration that was sent from the apparatus.
15. The computer program product of claim 9, wherein implementing the configuration comprises discontinuing communication occurring on an initialization channel and resetting resources in the apparatus and the at least one other apparatus in accordance with the configuration.
16. The computer program product of claim 9, wherein the communication between the apparatus and the at least one other apparatus is established via a wireless transport that is different from the wireless transport utilized to transmit the inquiry from the apparatus.
17. An apparatus, comprising:
  - at least one software-defined radio module; and
  - a processor, the processor being configured to:
    - initiate an inquiry from to at least one other apparatus;
    - receive remote characteristic information, the remote characteristic information corresponding to the at least one other apparatus;
    - determine local characteristic information;
    - formulate a configuration, the configuration being based on the remote characteristic information and the local characteristic information;
    - send the configuration to the at least one other apparatus;
    - implement the configuration; and
    - establish communication with at least one other apparatus in accordance with the configuration.

18. The apparatus of claim 17, wherein the inquiry is conducted via an initialization channel that is established in both the apparatus and the at least one other apparatus.
19. The apparatus of claim 17, wherein remote characteristic information comprises at least one of supported communication transport configuration information for the at least one other apparatus, power status information for the at least one other apparatus, processing load information for the at least one other apparatus, communication load information for the at least one other apparatus, proximate interference information for the at least one other apparatus, and user preferences configured in the at least one other apparatus.
20. The apparatus of claim 17, wherein local characteristic information comprises at least one of supported communication transport configuration information for the apparatus, power status information for the apparatus, processing load information for the apparatus, communication load information for the apparatus, proximate interference information for the apparatus, and user preferences configured in the apparatus.
21. The apparatus of claim 17, wherein the configuration comprises at least information that is required by the apparatus and the at least one other apparatus in order to establish communication via a wireless transport, the wireless transport being determined based on the remote characteristic information and the local characteristic information.
22. The apparatus of claim 17, wherein the configuration is sent via an initialization channel that is established in both the apparatus and the at least one other apparatus, the at least one other apparatus implementing the configuration that was sent from the apparatus.
23. The apparatus of claim 17, wherein implementing the configuration comprises discontinuing communication occurring on an initialization channel and resetting resources in the apparatus and the at least one other apparatus in accordance with the configuration.

24. The apparatus of claim 17, wherein the communication between the apparatus and the at least one other apparatus is established via a wireless transport that is different from the wireless transport utilized to transmit the inquiry from the apparatus.
25. An apparatus, comprising:
- means for initiating an inquiry from the apparatus to at least one other apparatus;
  - means for receiving remote characteristic information into the apparatus, the remote characteristic information corresponding to the at least one other apparatus;
  - means for determining local characteristic information in the apparatus;
  - means for formulating a configuration in the apparatus, the configuration being based on the remote characteristic information and the local characteristic information;
  - means for sending the configuration from the apparatus to the at least one other apparatus;
  - means for implementing the configuration in the apparatus; and
  - means for establishing communication between the apparatus and at least one other apparatus in accordance with the configuration.
26. A method, comprising:
- receiving wireless communication in an apparatus;
  - if the wireless communication includes an inquiry requesting characteristic information, determining characteristic information corresponding to the apparatus;
  - responding to the inquiry, the response comprising the characteristic information;
  - receiving further wireless communication in the apparatus, the further wireless communication including a configuration;
  - implementing the configuration in the apparatus; and
  - establishing communication in accordance with the configuration.

27. A computer program product comprising computer executable program code recorded on a computer readable medium, the computer executable program code comprising:
- computer program code configured to receive wireless communication in an apparatus;
  - computer program code configured to, if the wireless communication includes an inquiry requesting characteristic information, determine characteristic information corresponding to the apparatus;
  - computer program code configured to respond to the inquiry, the response comprising the characteristic information;
  - computer program code configured to receive further wireless communication in the apparatus, the further wireless communication including a configuration;
  - computer program code configured to implement the configuration in the apparatus; and
  - computer program code configured to establish communication in accordance with the configuration.
28. An apparatus, comprising:
- at least one radio module; and
  - a processor, the processor being configured to:
    - receive wireless communication in an apparatus;
    - if the wireless communication includes an inquiry requesting characteristic information, determine characteristic information corresponding to the apparatus;
    - respond to the inquiry, the response comprising the characteristic information;
    - receive further wireless communication in the apparatus, the further wireless communication including a configuration;
    - implement the configuration in the apparatus; and
    - establish communication in accordance with the configuration.



29. An apparatus, comprising:

means for receiving wireless communication in an apparatus;

means for, if the wireless communication includes an inquiry requesting characteristic information, determining characteristic information corresponding to the apparatus;

means for responding to the inquiry, the response comprising the characteristic information;

means for receiving further wireless communication in the apparatus, the further wireless communication including a configuration;

means for implementing the configuration in the apparatus; and

means for establishing communication in accordance with the configuration.

**ABSTRACT**

A system for configuring communication resources that are at least partially based upon reconfigurable software modules. An apparatus may utilize a plurality of transports for communication, wherein the transports are supported by one or more radio modules. The one or more radio modules may comprise hardware-based radio modules and software-defined radio (SDR) modules including a reconfigurable software element that allows the radio module to emulate the functionality of multiple hardware-based radios. In accordance with at least one embodiment of the present invention, SDR modules in an apparatus may formulate a communication configuration for use in communicating with another apparatus based on remote characteristic information (e.g., information corresponding to the apparatus with which communication is desired) and local characteristic information pertaining to the apparatus.

## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>				
<b>Filing Date:</b>				
<b>Title of Invention:</b>	SOFTWARE-DEFINED RADIO CONFIGURATON			
<b>First Named Inventor/Applicant Name:</b>	Pertti TOLONEN			
<b>Filer:</b>	Elliot Lyle Frank/Jacqueline Brooking			
<b>Attorney Docket Number:</b>	4208-4408			
Filed as Large Entity				
<b>Utility under 35 USC 111(a) Filing Fees</b>				
<b>Description</b>	<b>Fee Code</b>	<b>Quantity</b>	<b>Amount</b>	<b>Sub-Total in USD(\$)</b>
<b>Basic Filing:</b>				
Utility application filing	1011	1	310	310
Utility Search Fee	1111	1	510	510
Utility Examination Fee	1311	1	210	210
<b>Pages:</b>				
<b>Claims:</b>				
Claims in excess of 20	1202	9	50	450
Independent claims in excess of 3	1201	5	210	1050
<b>Miscellaneous-Filing:</b>				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
<b>Extension-of-Time:</b>				
<b>Miscellaneous:</b>				
<b>Total in USD (\$)</b>				<b>2530</b>

**Electronic Acknowledgement Receipt**

<b>EFS ID:</b>	3883175
<b>Application Number:</b>	12203746
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	3717
<b>Title of Invention:</b>	SOFTWARE-DEFINED RADIO CONFIGURATON
<b>First Named Inventor/Applicant Name:</b>	Pertti TOLONEN
<b>Customer Number:</b>	27123
<b>Filer:</b>	Elliot Lyle Frank/Jacqueline Brooking
<b>Filer Authorized By:</b>	Elliot Lyle Frank
<b>Attorney Docket Number:</b>	4208-4408
<b>Receipt Date:</b>	03-SEP-2008
<b>Filing Date:</b>	
<b>Time Stamp:</b>	17:51:31
<b>Application Type:</b>	Utility under 35 USC 111(a)

**Payment information:**

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$2530
RAM confirmation Number	3040
Deposit Account	134500
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

**File Listing:**

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal of New Application	4208-4448utiltrn.pdf	120270 6f34df79b12c65c2ba386151432109856f3b06e	no	4

**Warnings:****Information:**

2	Application Data Sheet	4208-4448ADS.pdf	1026682 7166e6fb05d0c7f4f37ea9ec474701713ecd0645	no	4
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**Warnings:****Information:**

3		4208-4448spec.pdf	2124601 97f04ce662ce803e90495ef7edfa2b77910d2f53	yes	42
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**Multipart Description/PDF files in .zip description**

Document Description	Start	End
Specification	1	33
Claims	34	41
Abstract	42	42

**Warnings:****Information:**

4	Drawings-only black and white line drawings	4208-4448Drawings.pdf	316529 6716008c9d2634dc4c0820c6f70b7b897f41faf	no	23
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**Warnings:****Information:**

5	Fee Worksheet (PTO-06)	fee-info.pdf	37932 0921292bc58281435f7ddb7711a13db891ae158d	no	2
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**Warnings:****Information:**

<b>Total Files Size (in bytes):</b>			3626014
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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

**New Applications Under 35 U.S.C. 111**

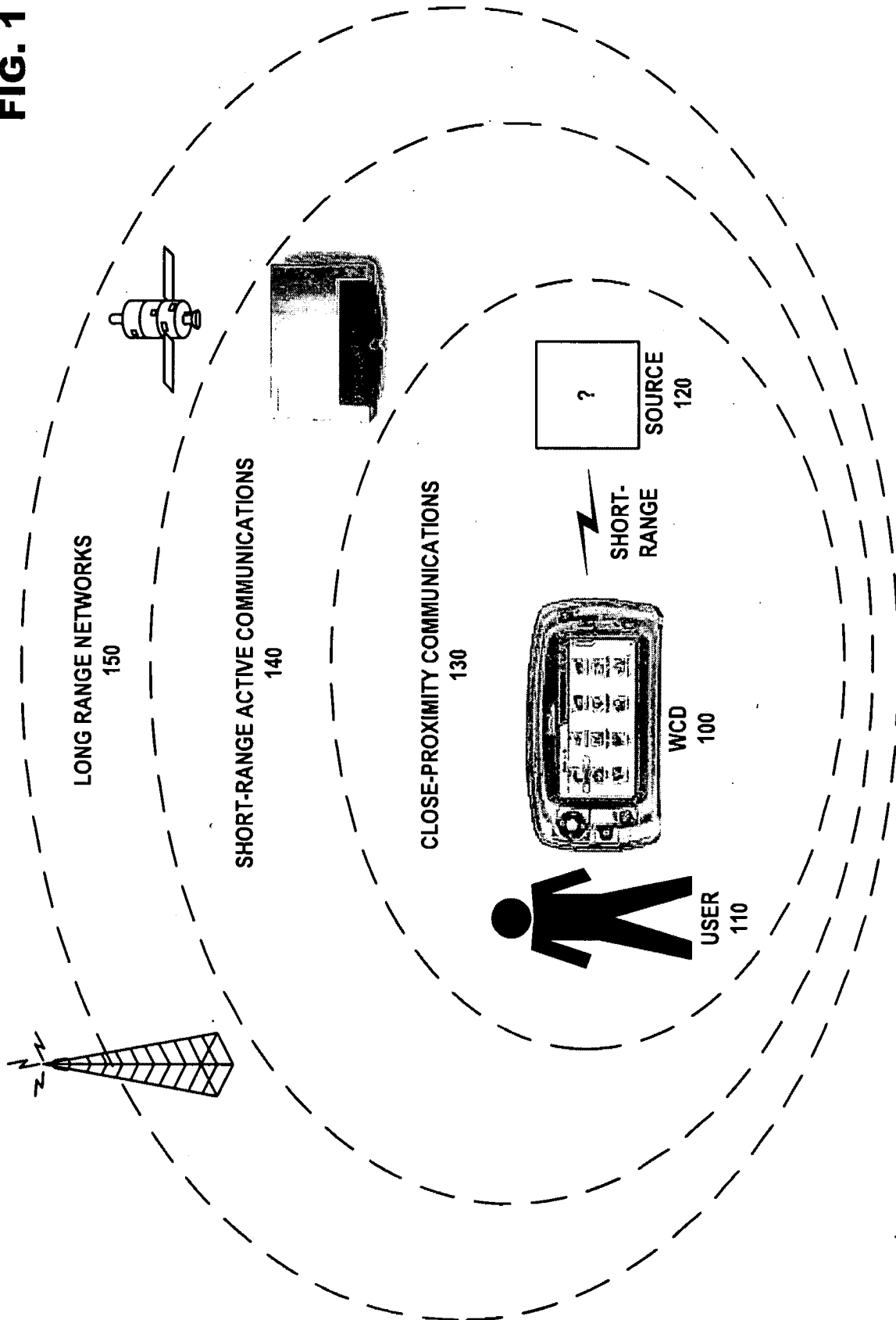
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

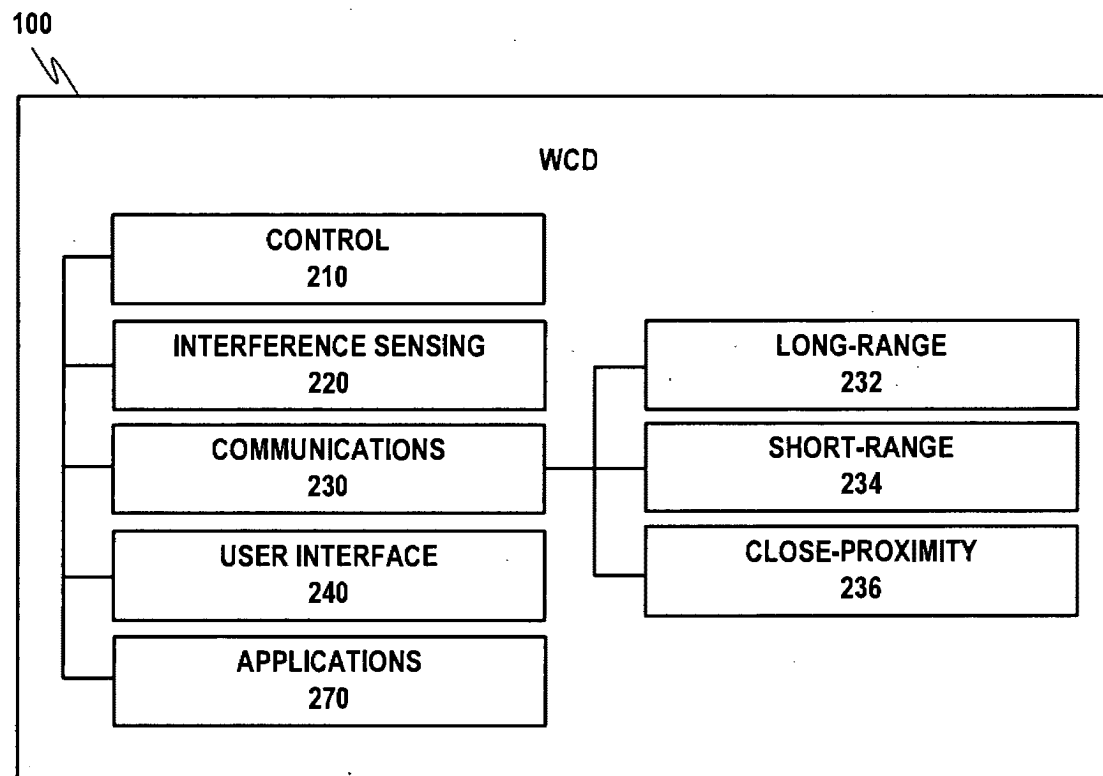
**New International Application Filed with the USPTO as a Receiving Office**

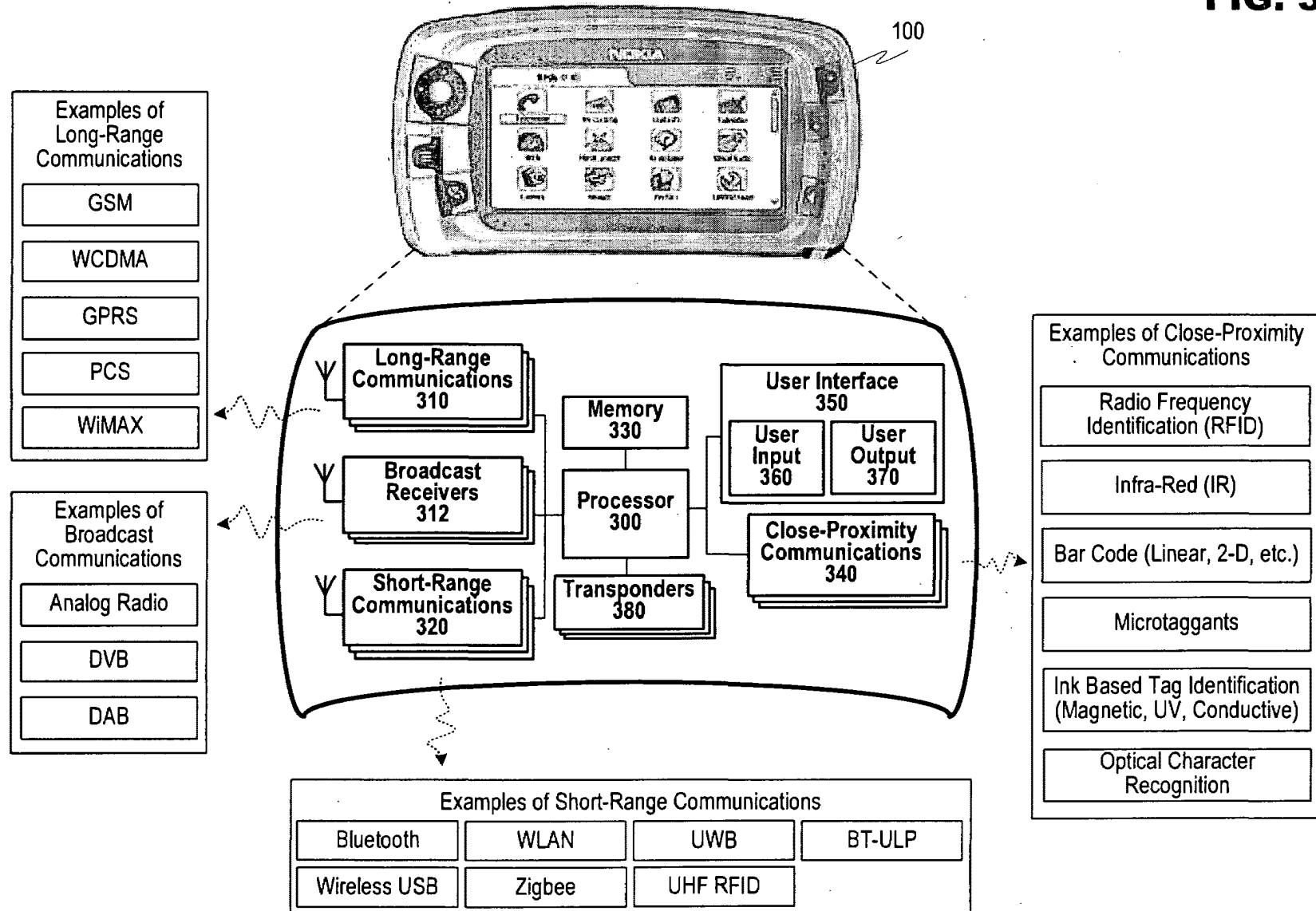
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

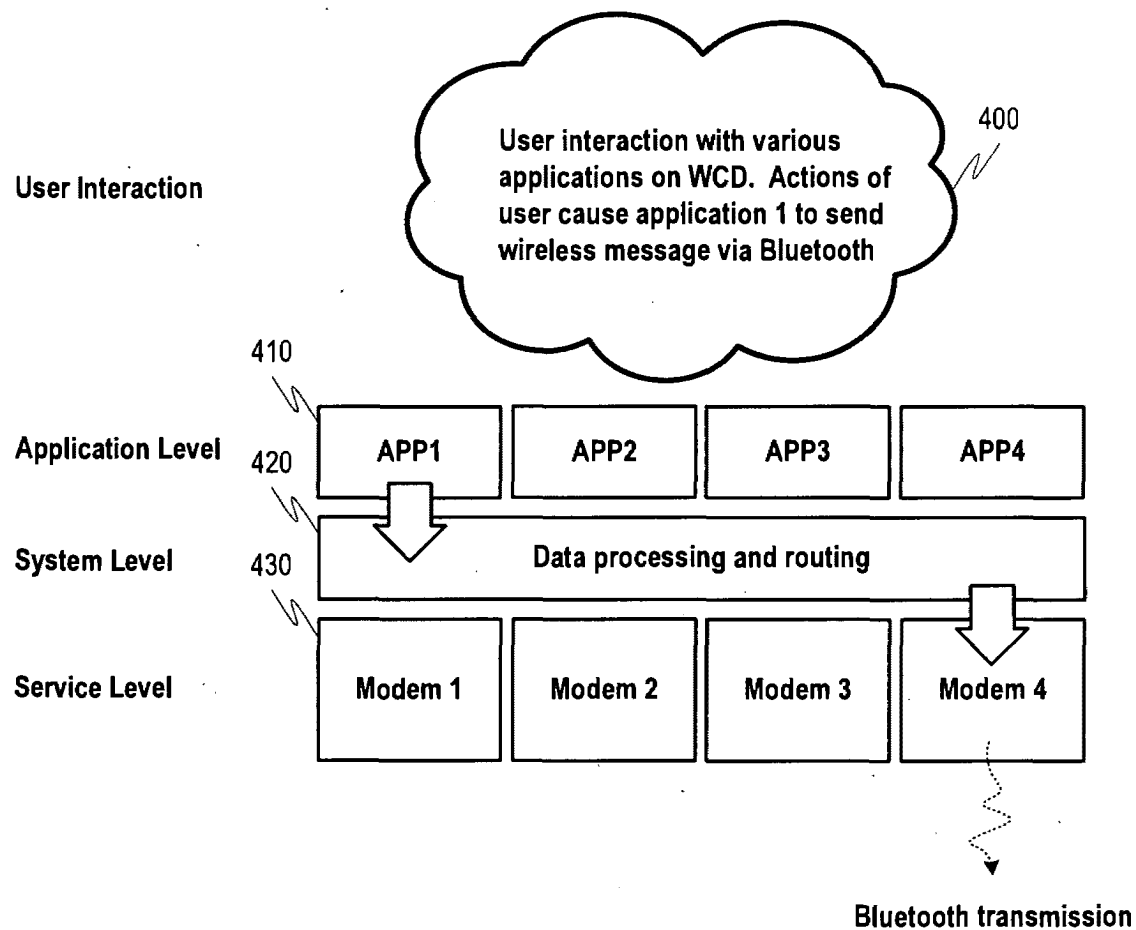
**FIG. 1**



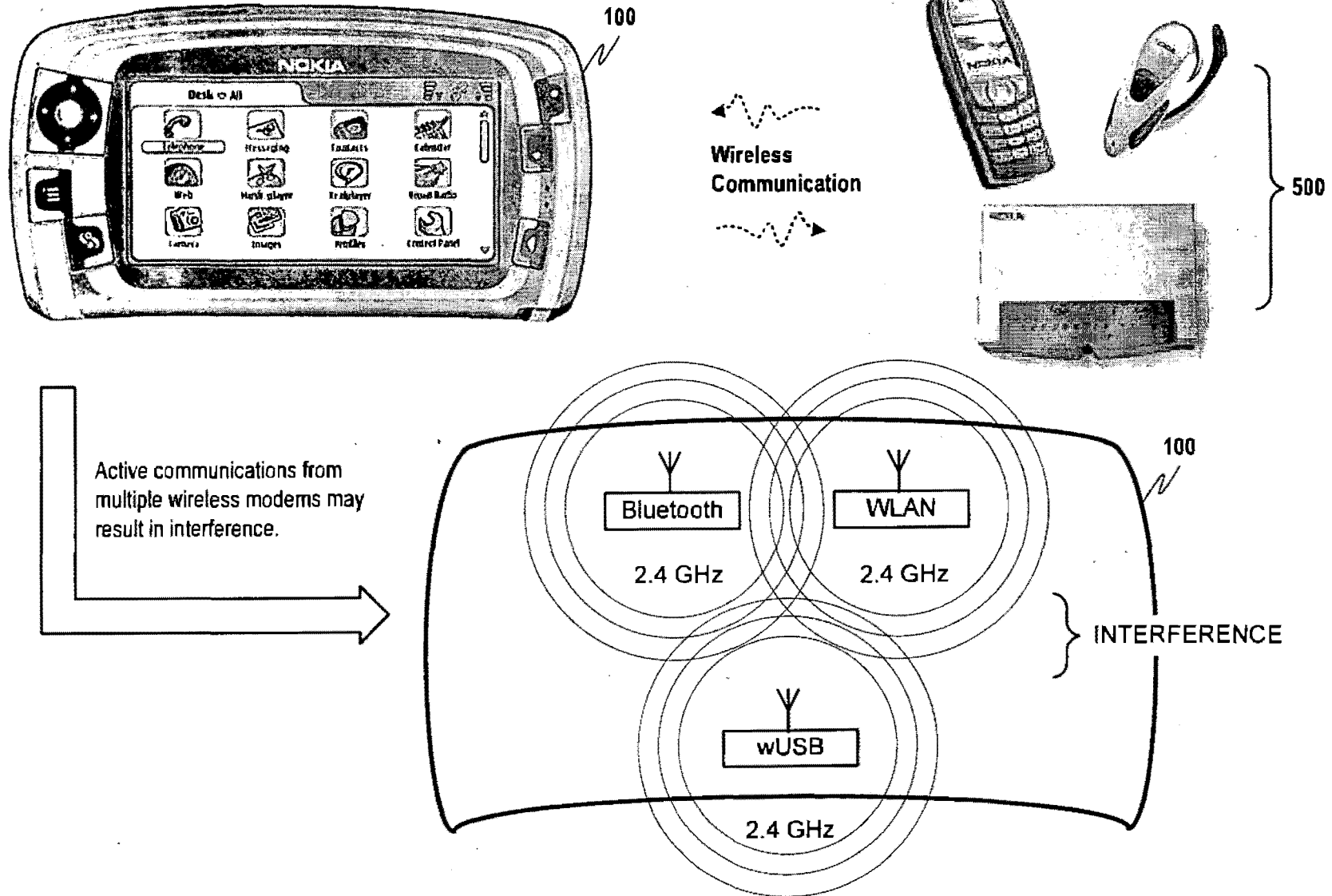
**FIG. 2**



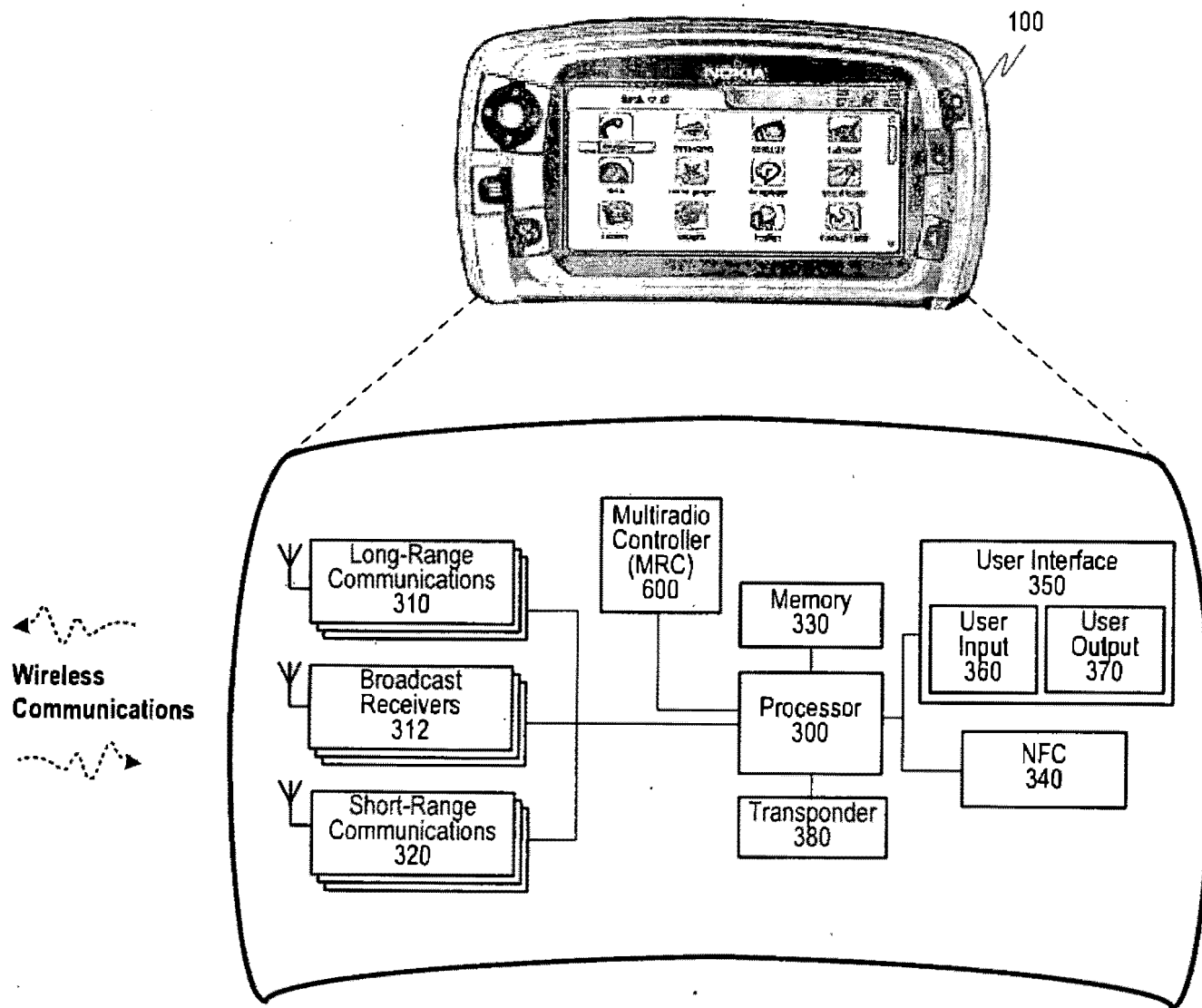
**FIG. 3**

**FIG. 4**

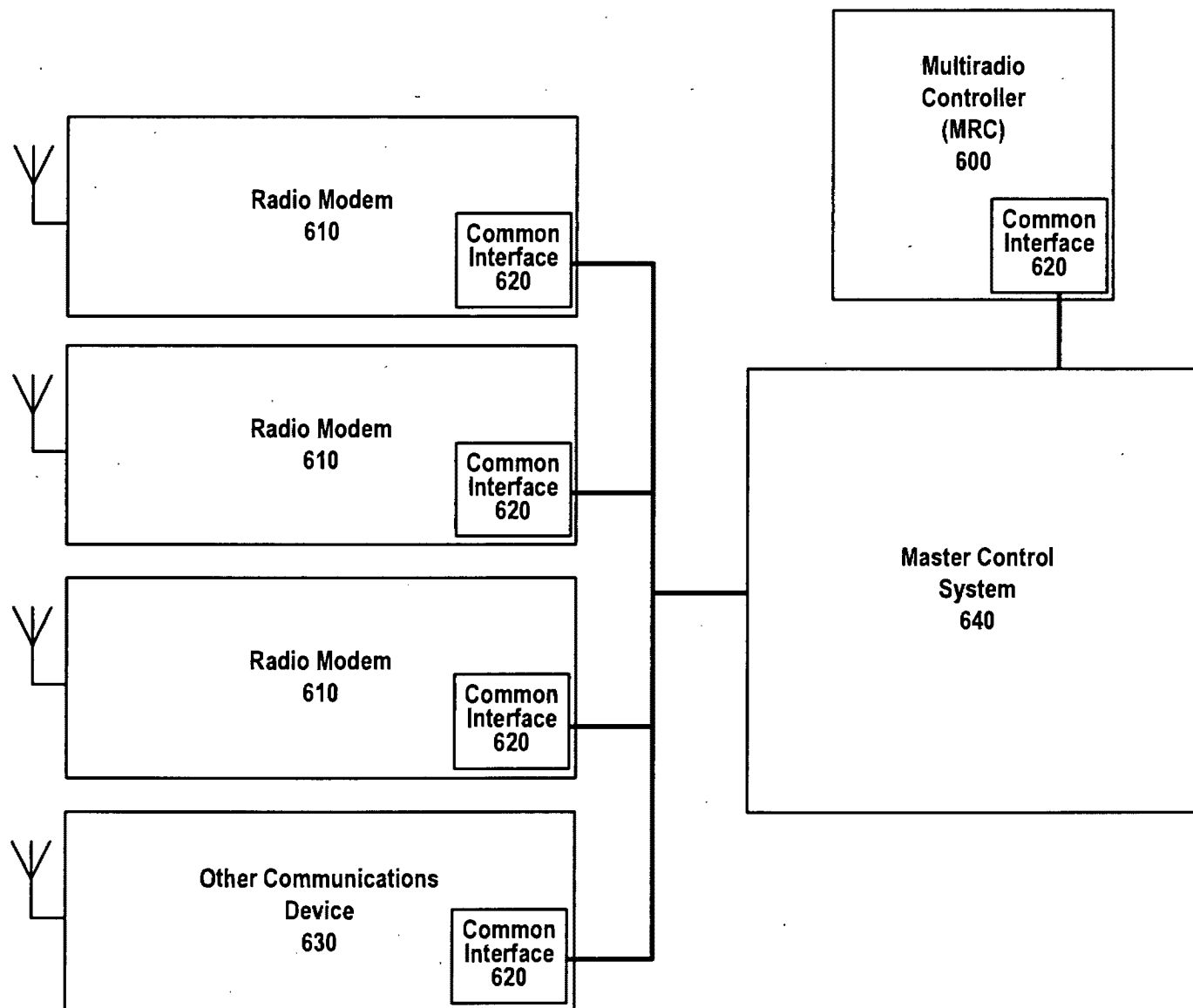
**FIG. 5**

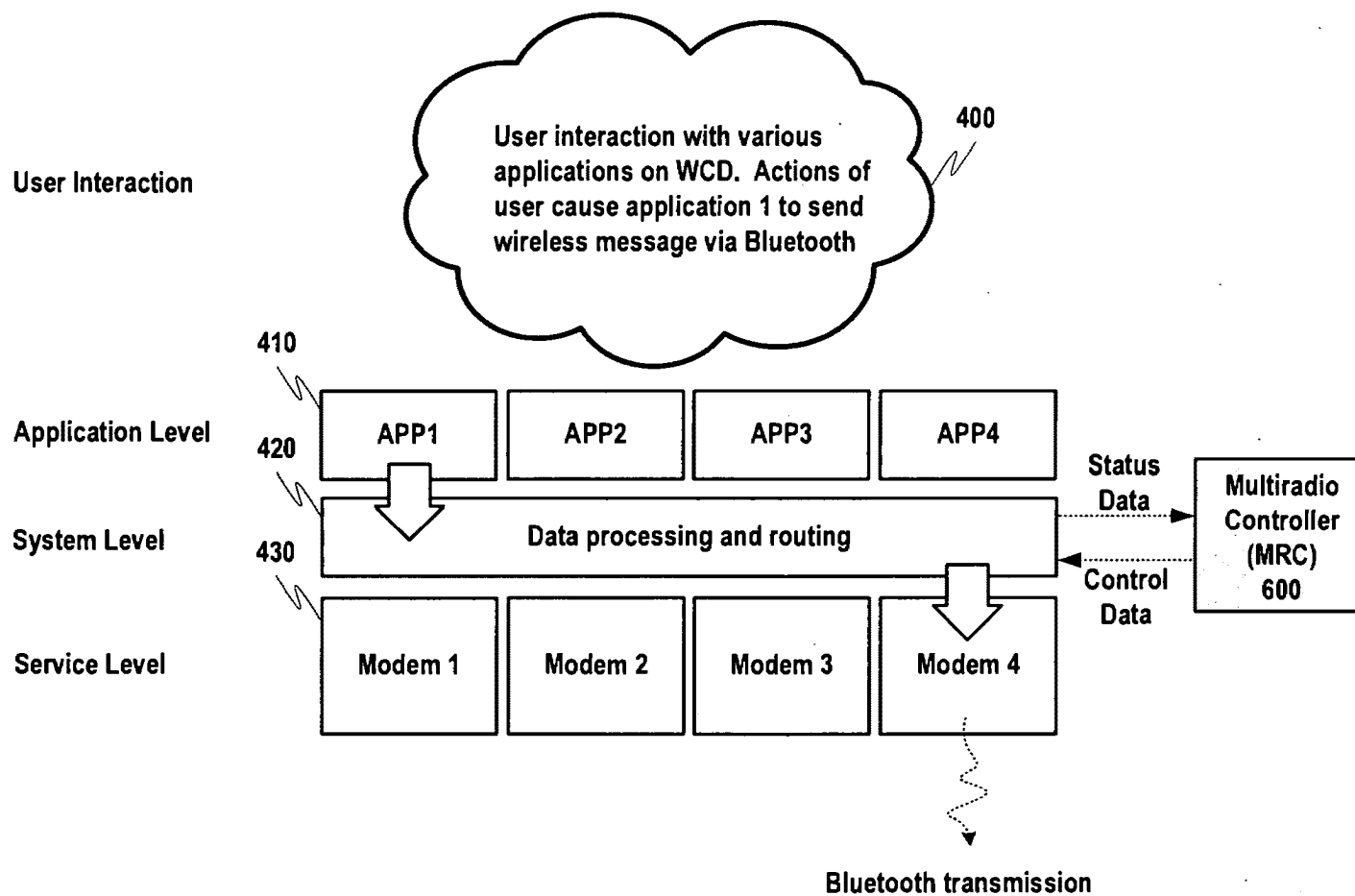


**FIG. 6A**

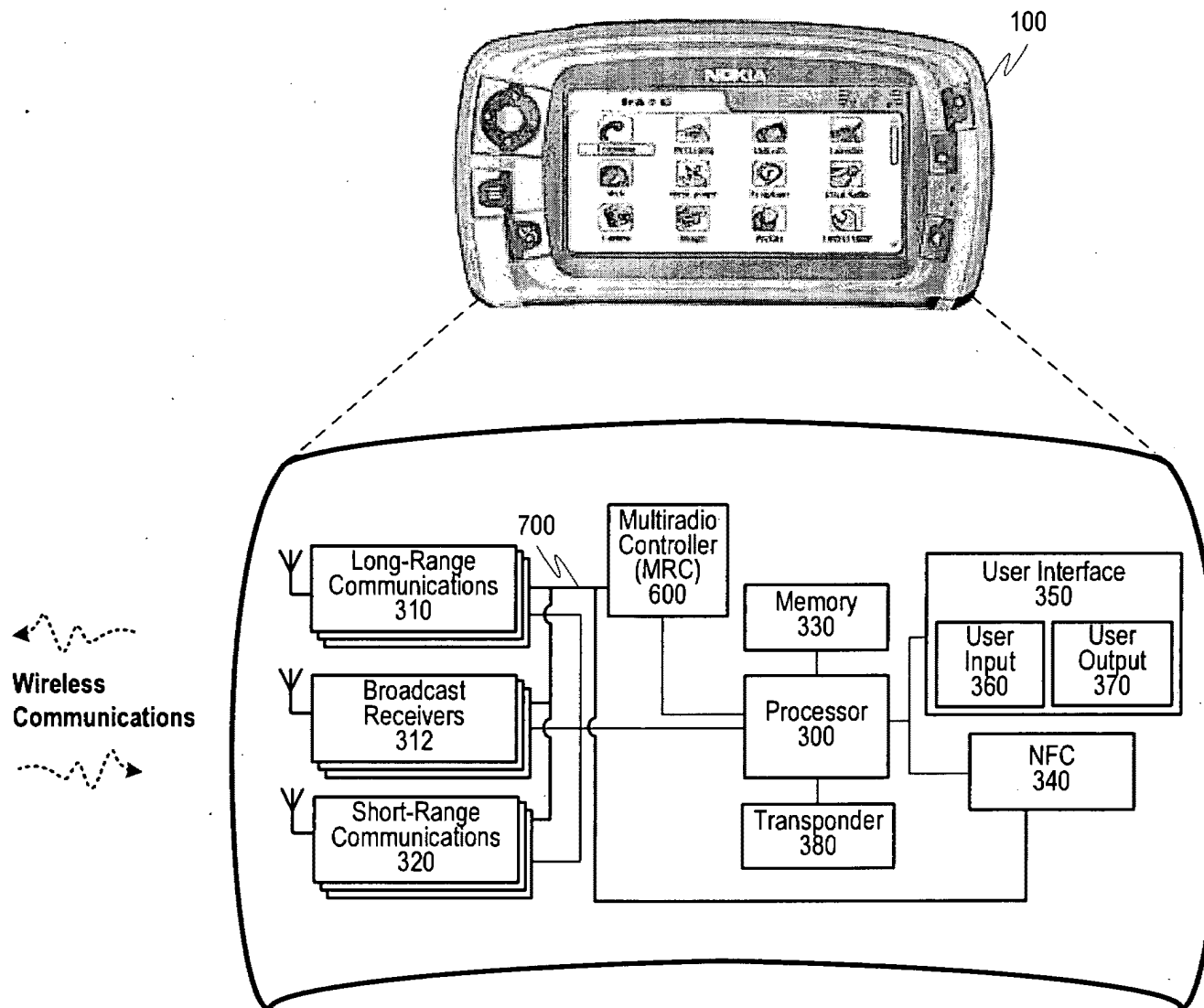


**FIG. 6B**

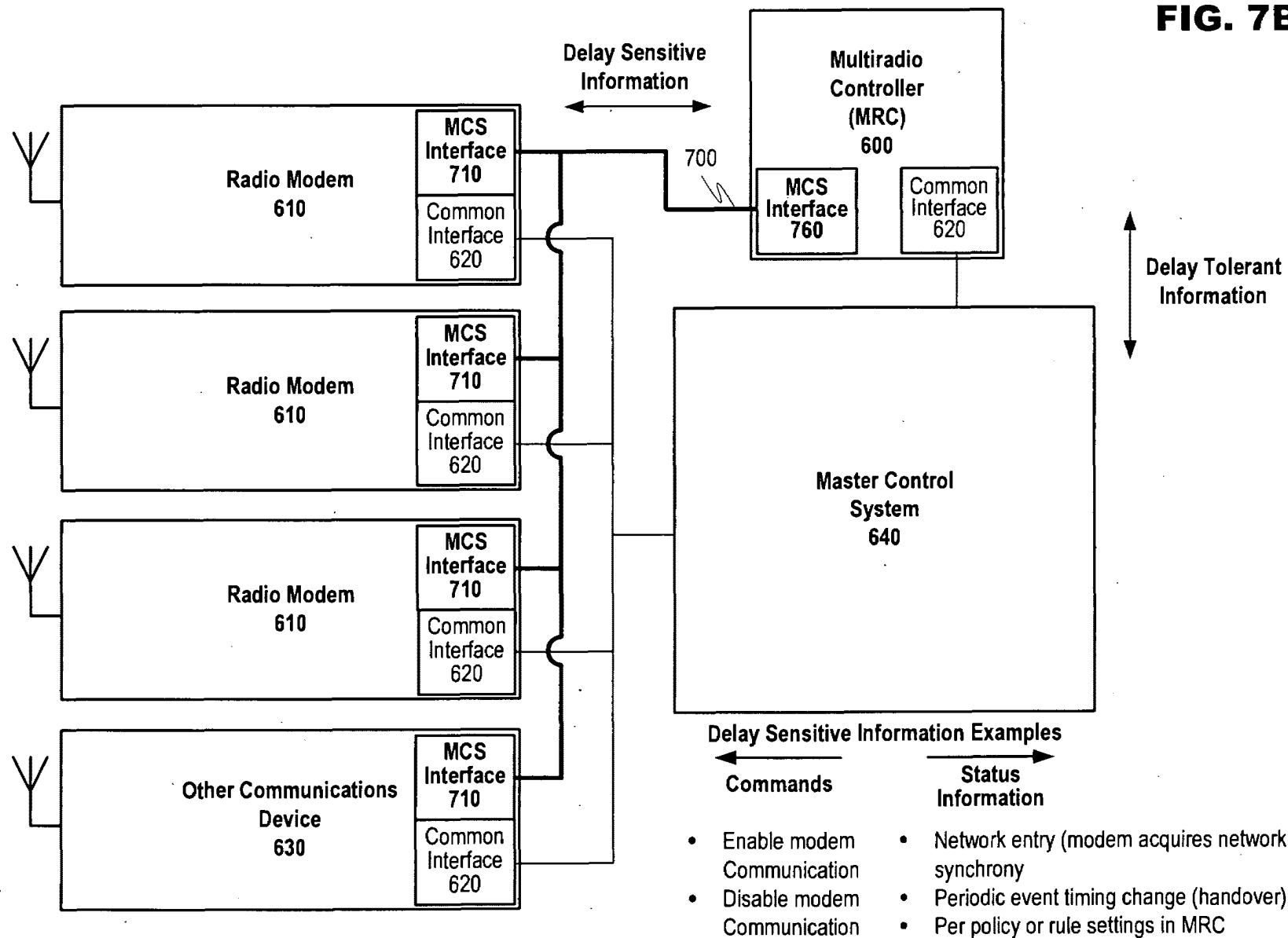


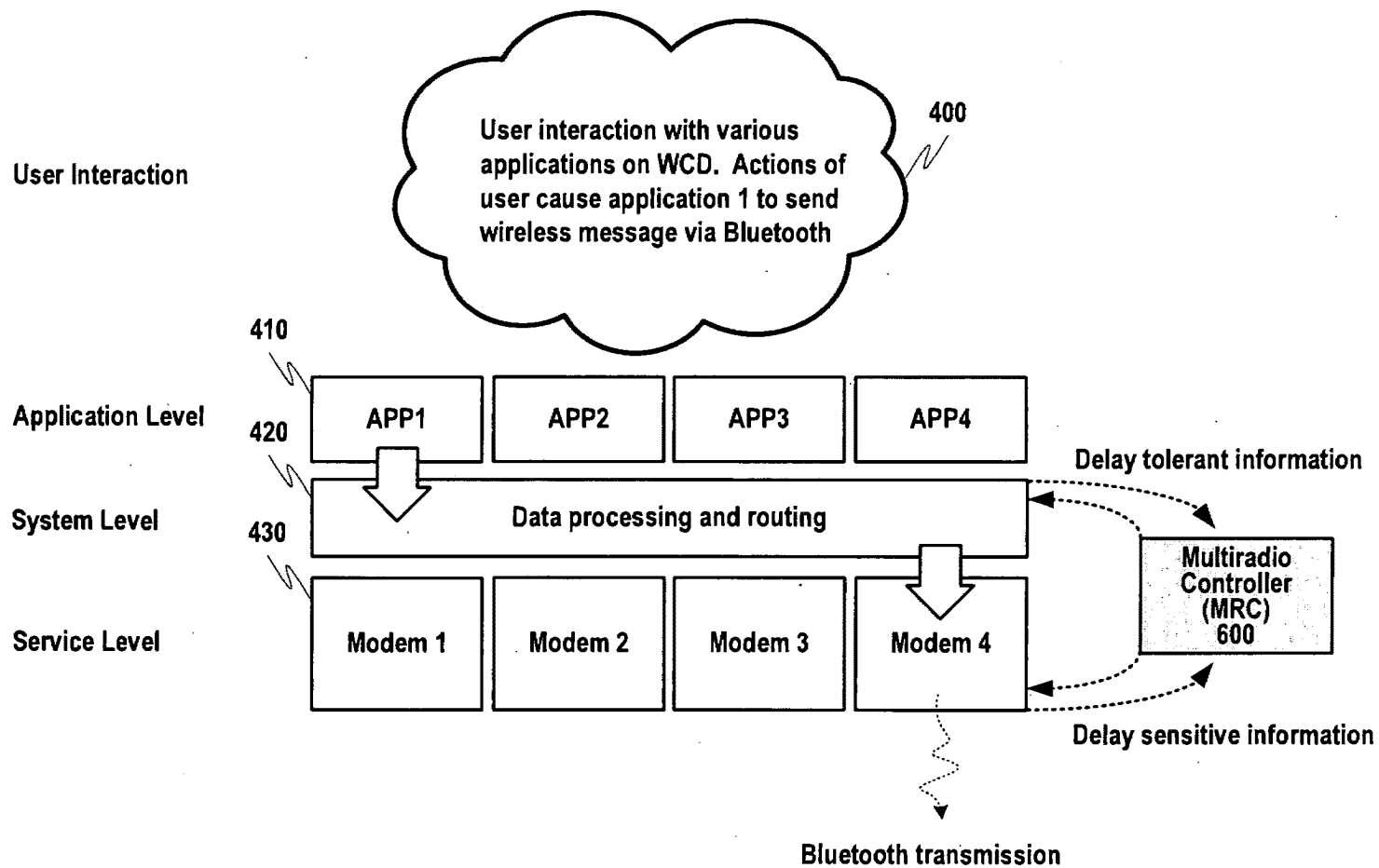
**FIG. 6C**

**FIG. 7A**

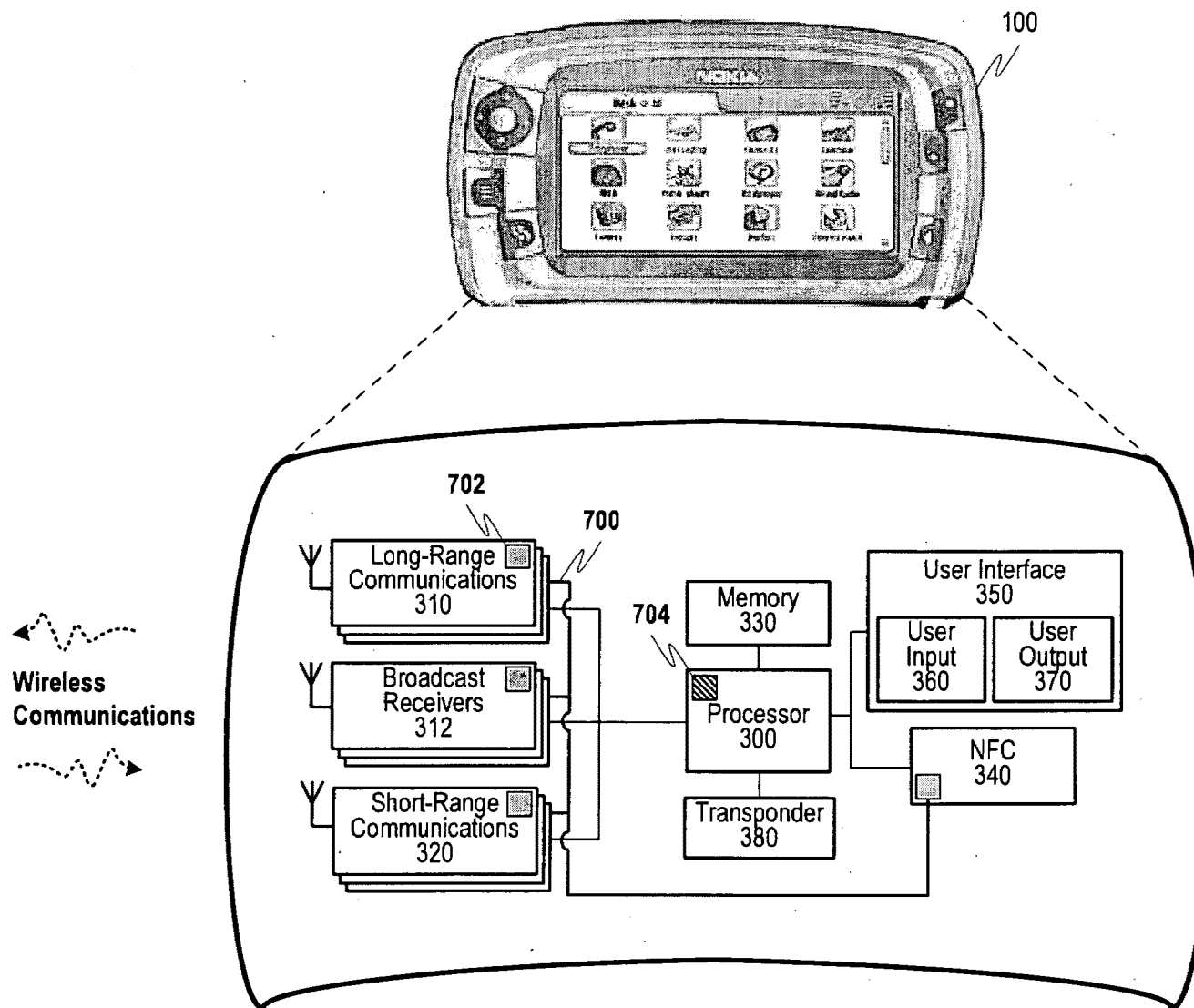


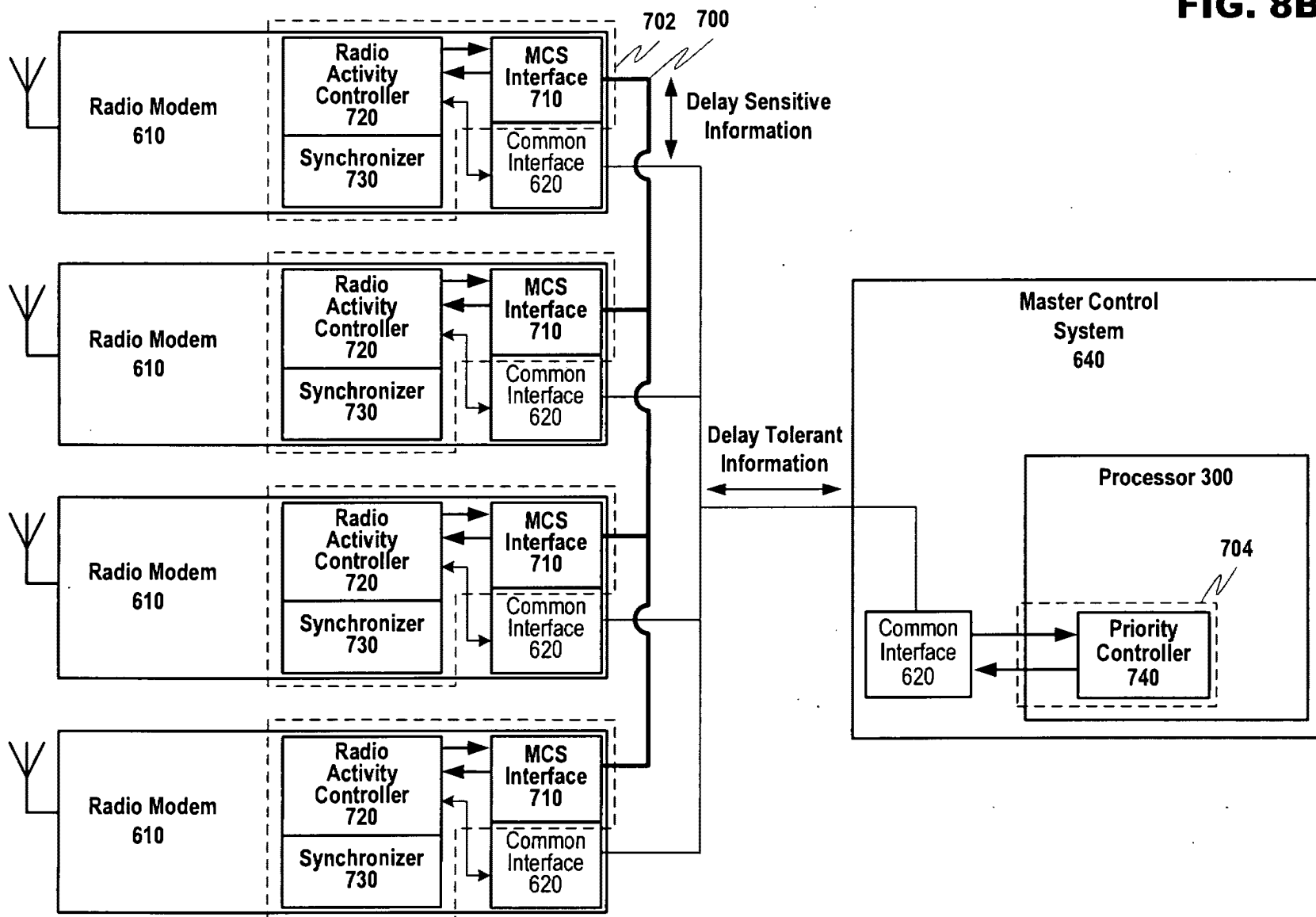


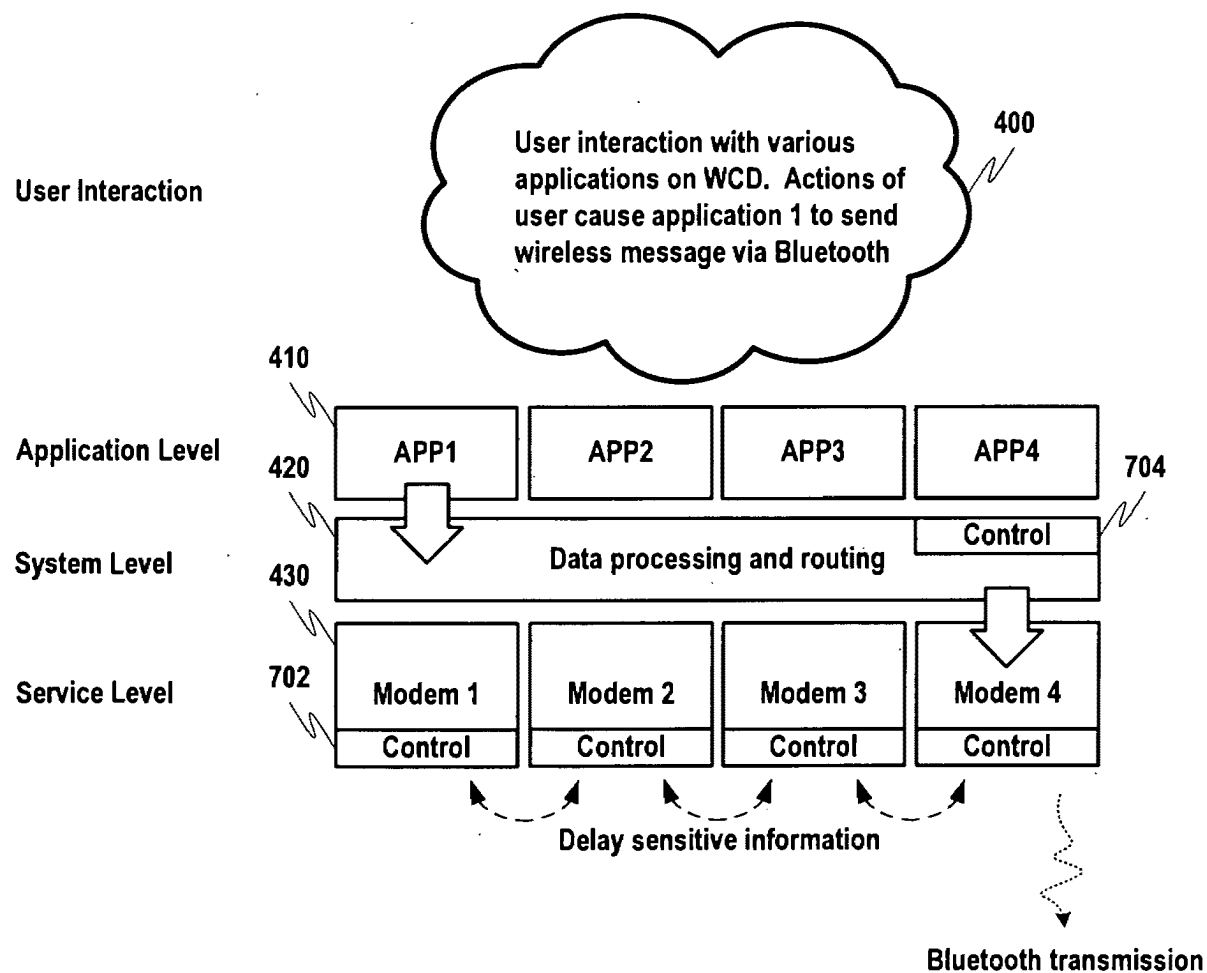


**FIG. 7C**

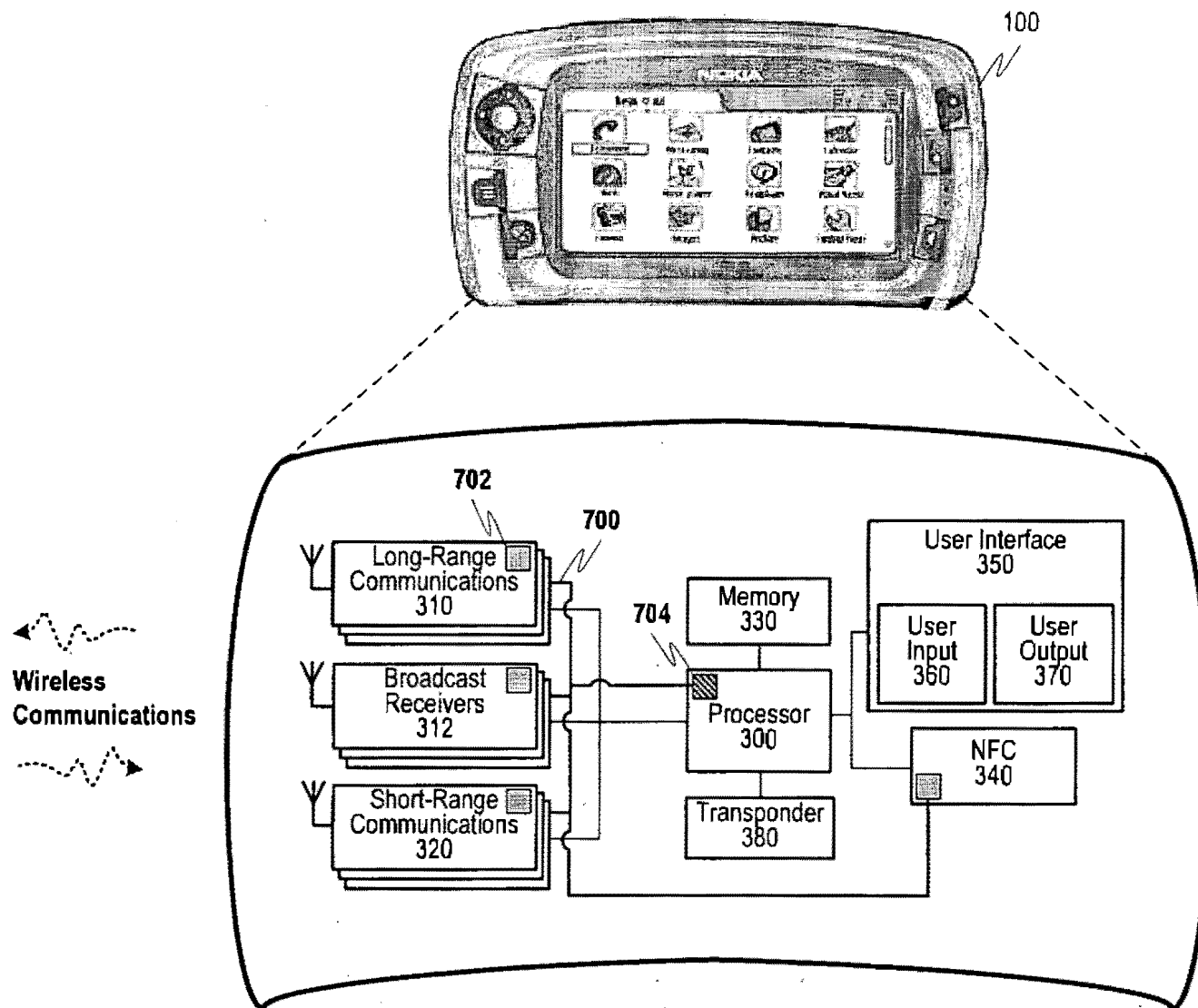
**FIG. 8A**

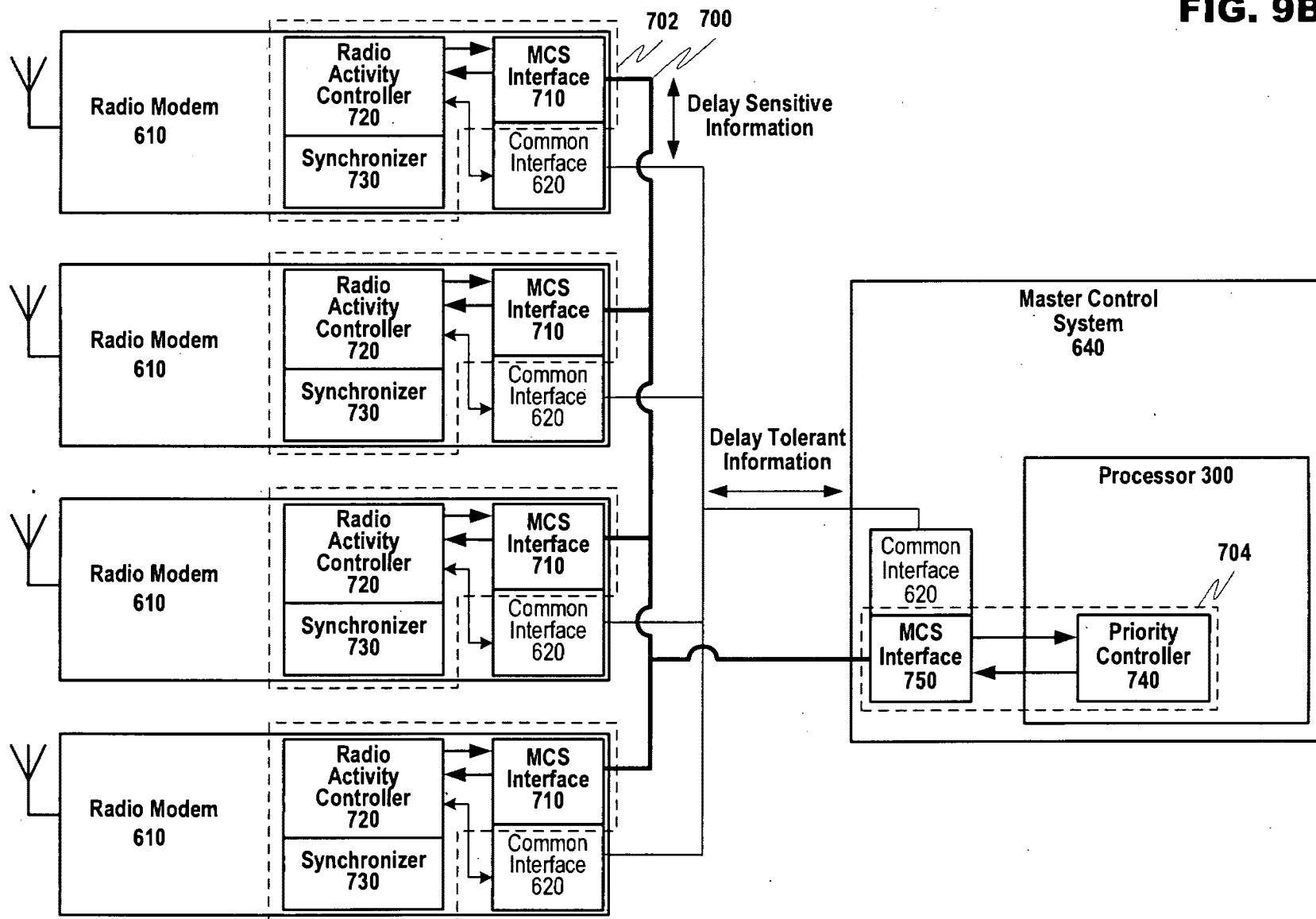


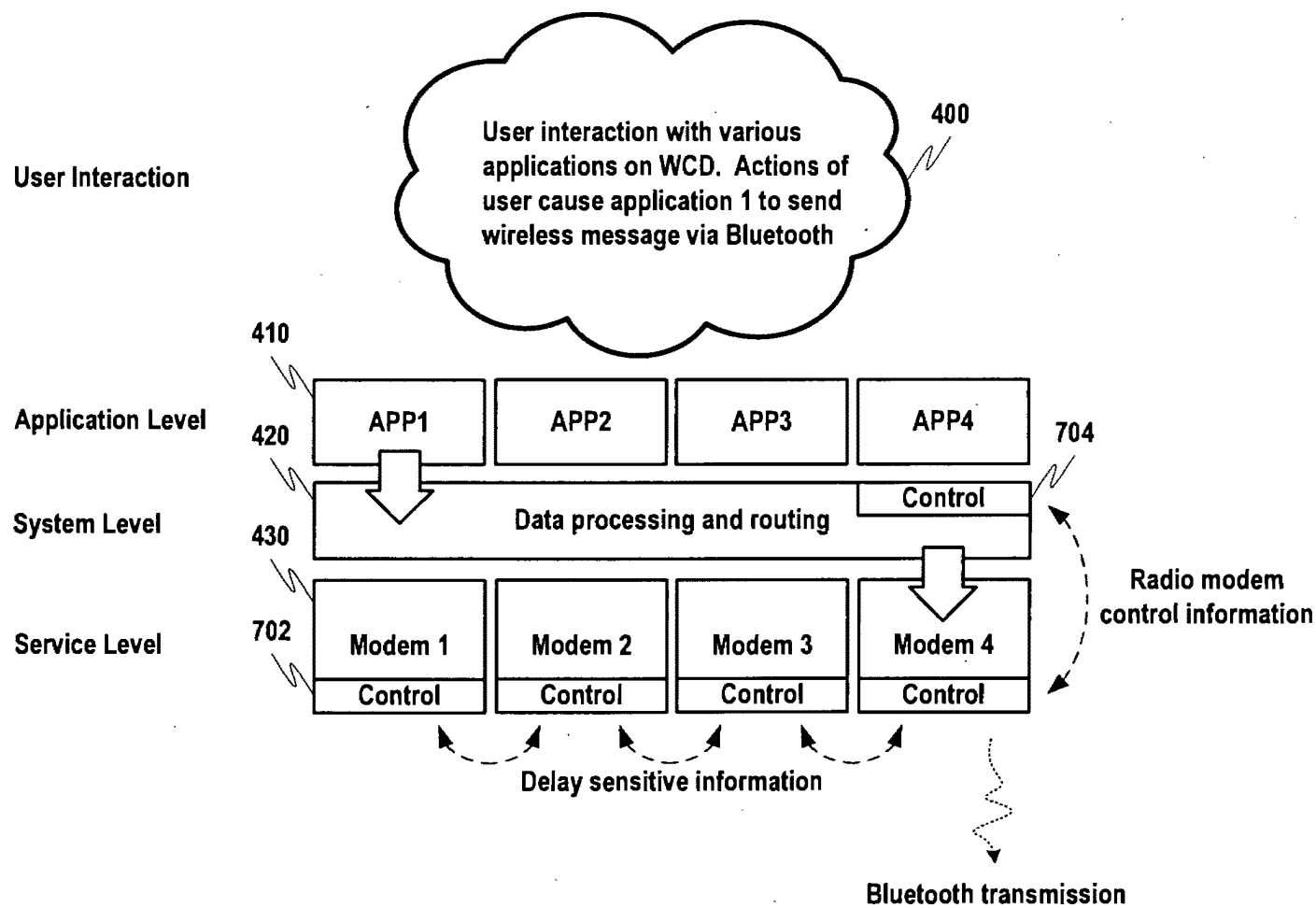
**FIG. 8B**

**FIG. 8C**

**FIG. 9A**

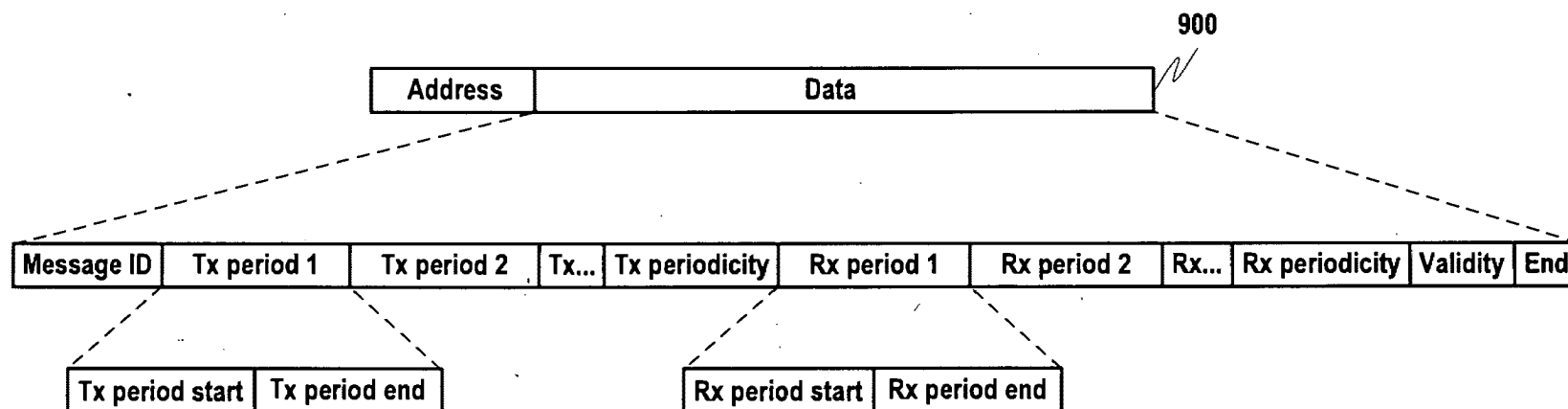


**FIG. 9B**

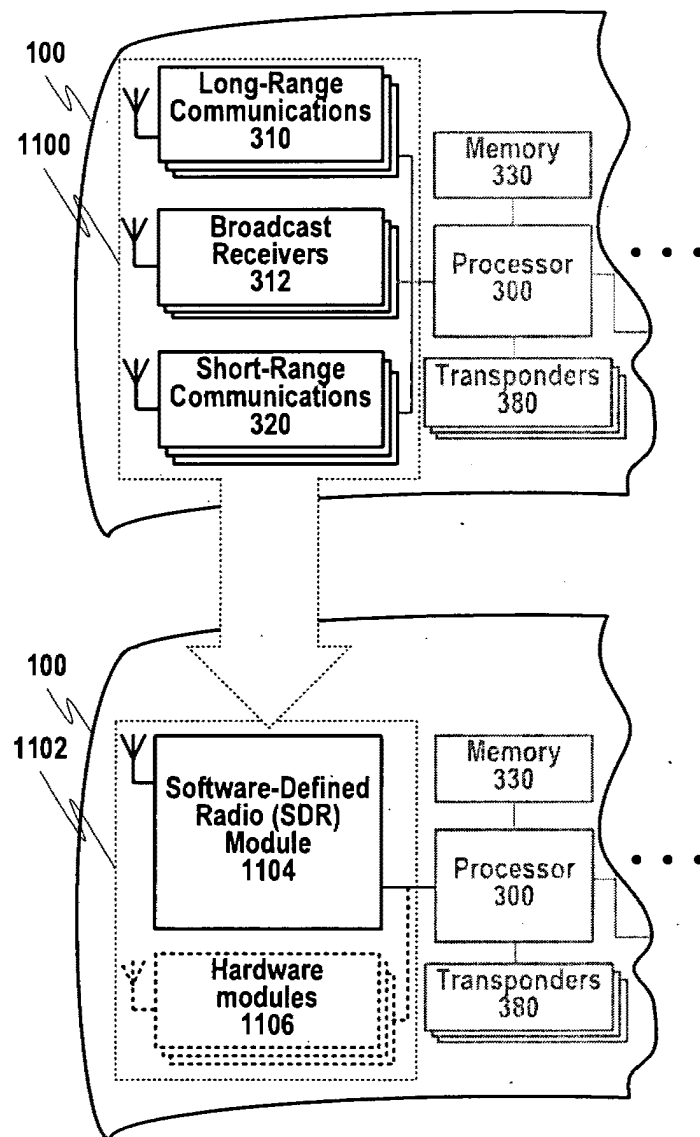
**FIG. 9C**

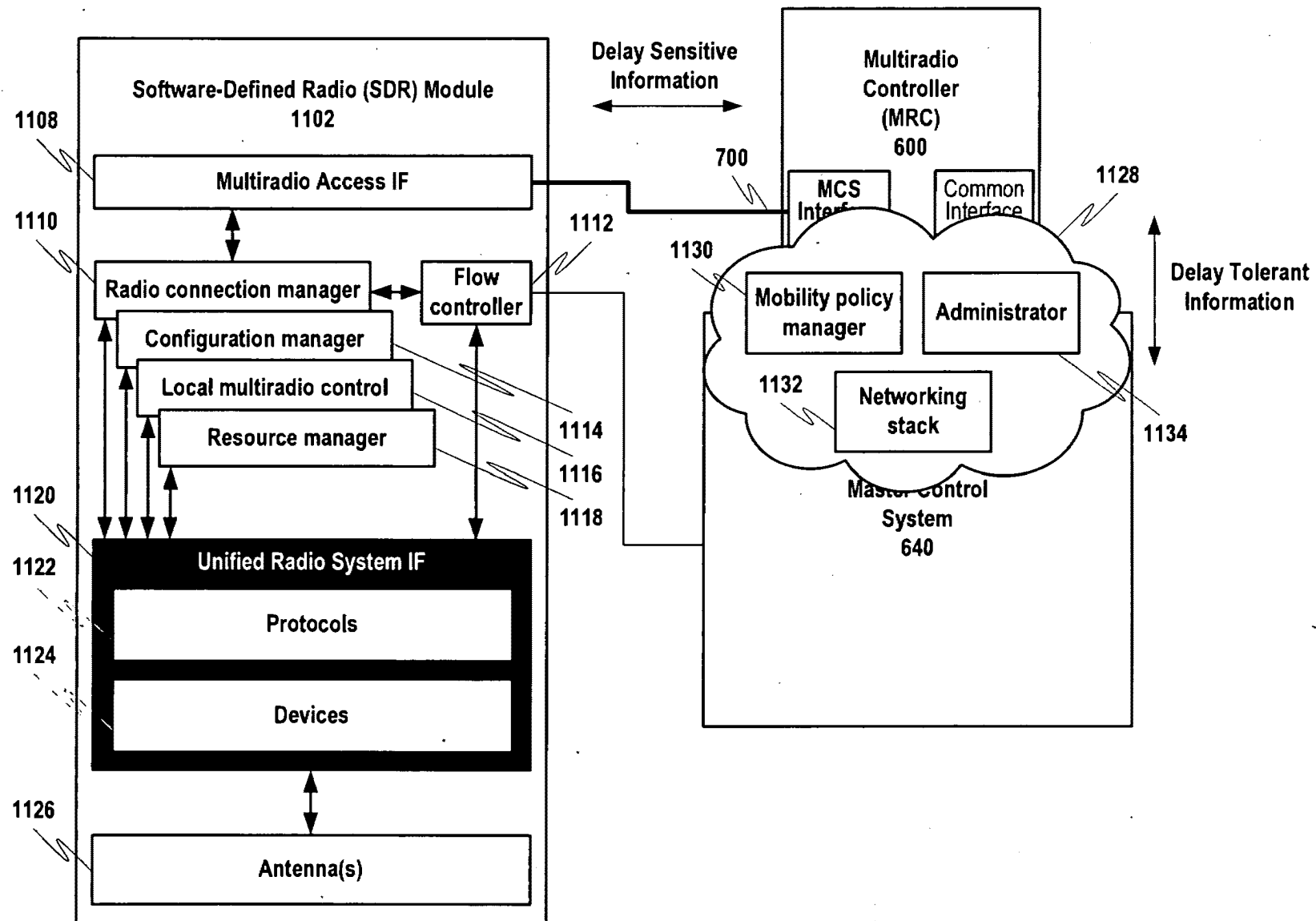


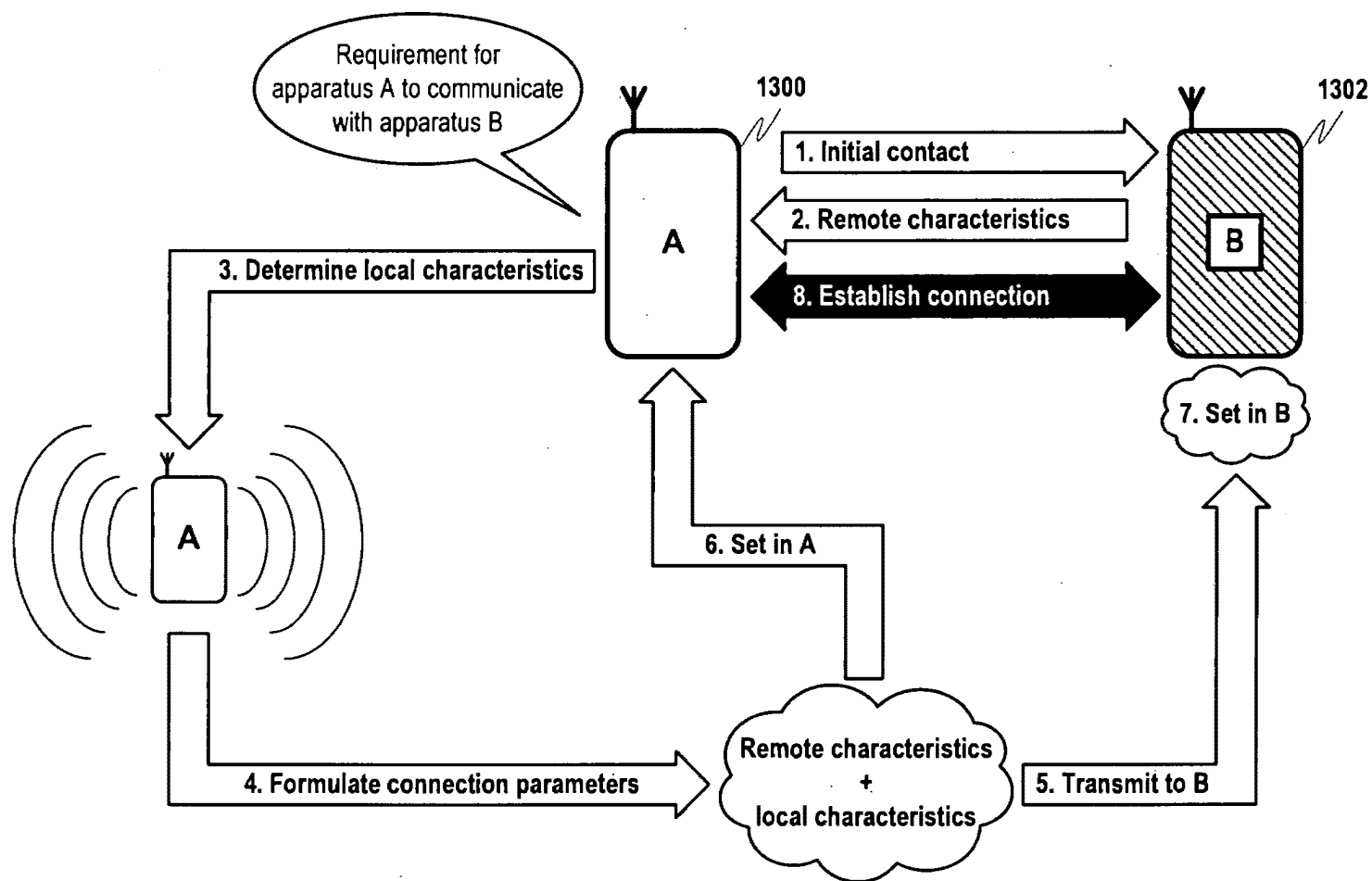
**FIG. 10**

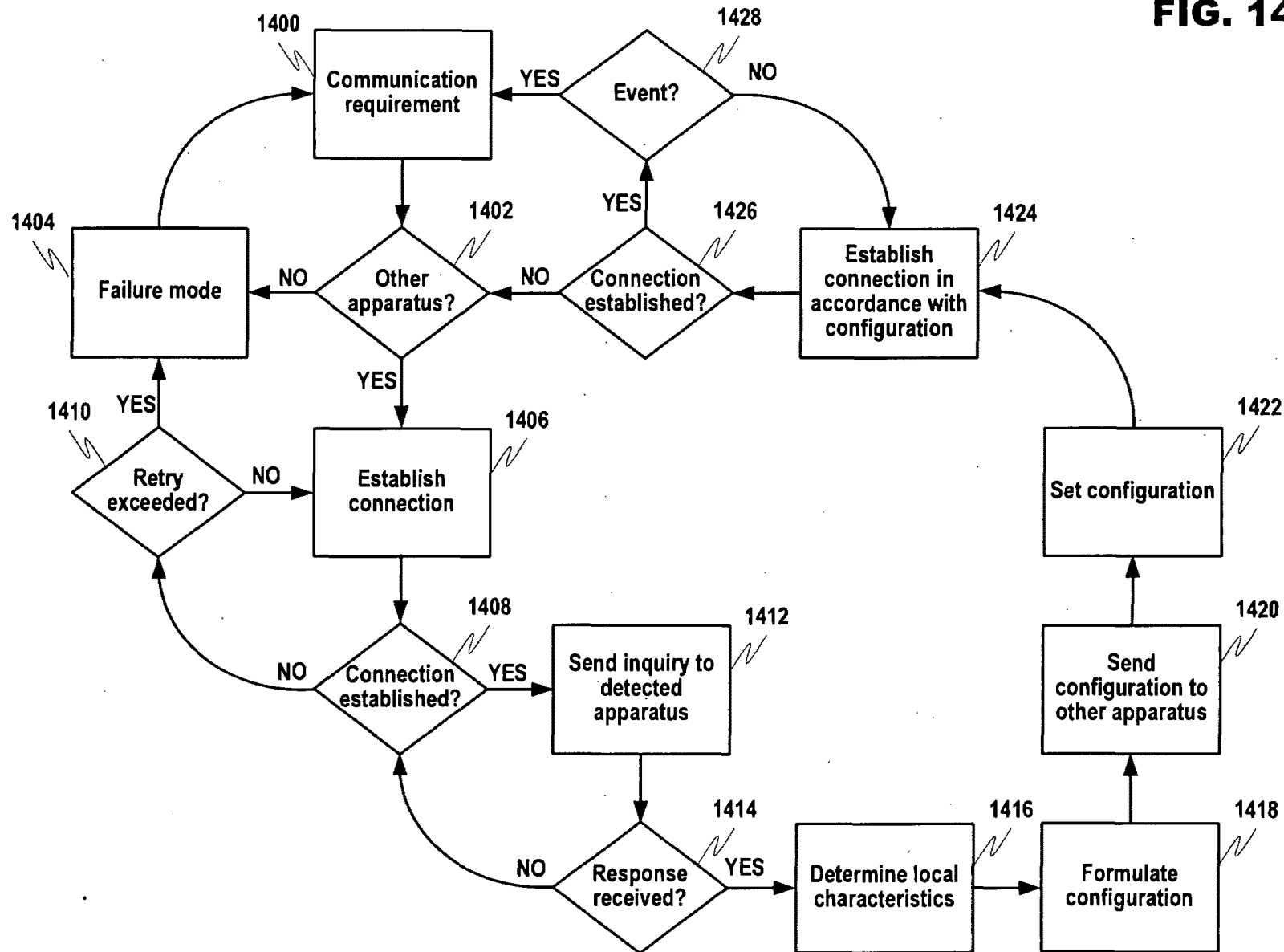


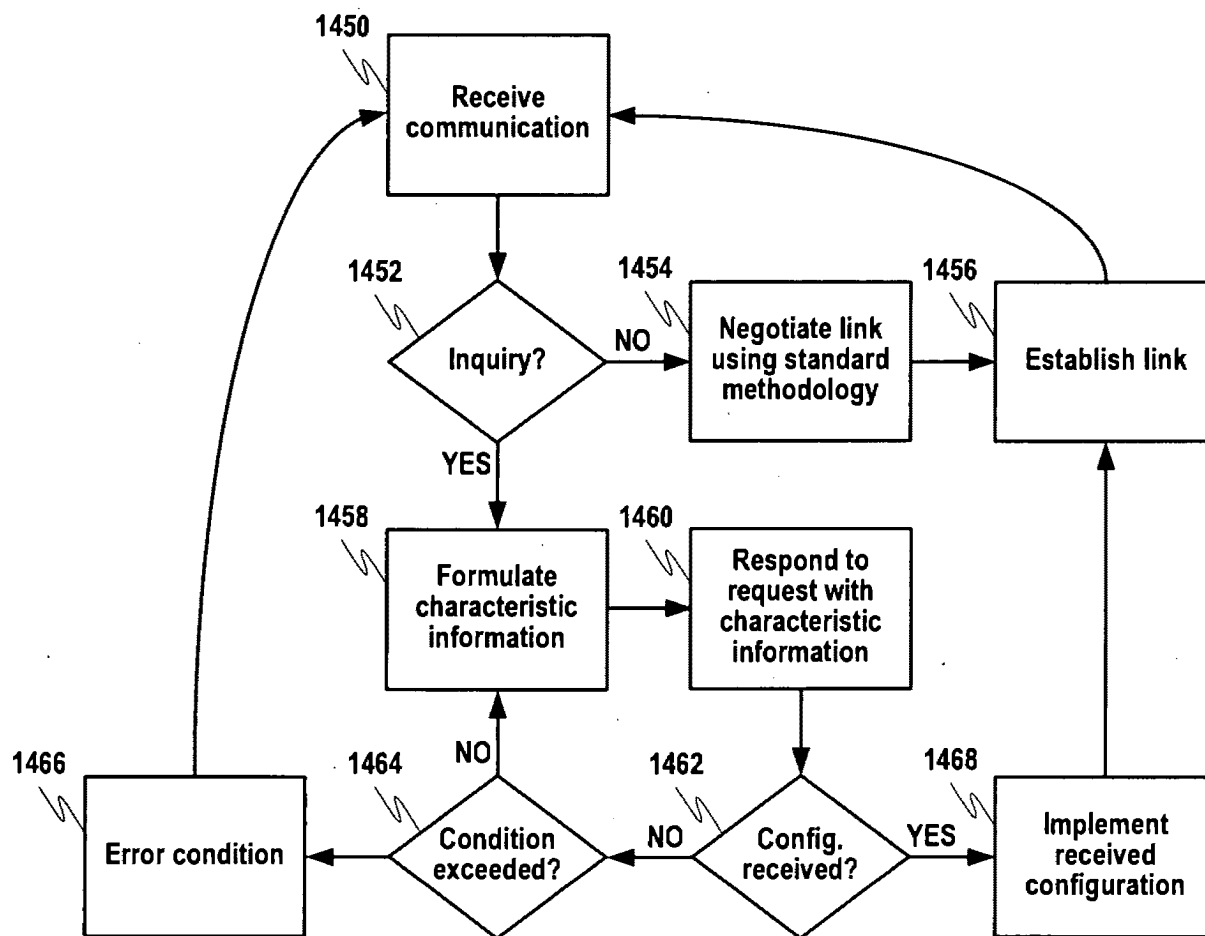
**FIG. 11**



**FIG. 12**

**FIG. 13**

**FIG. 14A**

**FIG. 14B**

Approved for use through 7/31/2006. OMB 0651-0032

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

PATENT APPLICATION FEE DETERMINATION RECORD

Application or Docket Number

12/203,746

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TOTAL

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OR

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X =	
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TOTAL  
ADD'T FEETOTAL  
ADD'T FEE

- This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/203,746	09/03/2008	Pertti TOLONEN	4208-4448

27123  
 MORGAN & FINNEGAN, L.L.P.  
 3 WORLD FINANCIAL CENTER  
 NEW YORK, NY 10281-2101

**CONFIRMATION NO. 3717**  
**FORMALITIES LETTER**



\*OC000000032082212\*

Date Mailed: 09/19/2008

**NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION****FILED UNDER 37 CFR 1.53(b)***Filing Date Granted***Items Required To Avoid Abandonment:**

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The oath or declaration is missing.

*A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.*

*Note: If a petition under 37 CFR 1.47 is being filed, an oath or declaration in compliance with 37 CFR 1.63 signed by all available joint inventors, or if no inventor is available by a party with sufficient proprietary interest, is required.*

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- To avoid abandonment, a surcharge (for late submission of filing fee, search fee, examination fee or oath or declaration) as set forth in 37 CFR 1.16(f) of \$130 for a non-small entity, must be submitted with the missing items identified in this notice.

**SUMMARY OF FEES DUE:**

Total additional fee(s) required for this application is \$130 for a non-small entity

- \$130 Surcharge.



Replies should be mailed to:

Mail Stop Missing Parts  
Commissioner for Patents  
P.O. Box 1450  
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web.

<https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html>

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If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

/mkoroma/

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Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
12/203,746	09/03/2008	2614	2530	4208-4448	29	8

CONFIRMATION NO. 3717

27123  
 MORGAN & FINNEGAN, L.L.P.  
 3 WORLD FINANCIAL CENTER  
 NEW YORK, NY 10281-2101

## FILING RECEIPT



\*OC000000032082211\*

Date Mailed: 09/19/2008

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

**Applicant(s)**

Pertti TOLONEN, Vantaa, FINLAND;

**Assignment For Published Patent Application**

NOKIA CORPORATION, Espoo, FINLAND

**Power of Attorney:** None**Domestic Priority data as claimed by applicant****Foreign Applications****If Required, Foreign Filing License Granted:** 09/15/2008

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/203,746**

**Projected Publication Date:** To Be Determined - pending completion of Missing Parts**Non-Publication Request:** No**Early Publication Request:** No

**Title**

SOFTWARE-DEFINED RADIO CONFIGURATION

**Preliminary Class**

379

**PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES**

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

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For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

**LICENSE FOR FOREIGN FILING UNDER****Title 35, United States Code, Section 184****Title 37, Code of Federal Regulations, 5.11 & 5.15****GRANTED**

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as

set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

#### **NOT GRANTED**

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

Docket No. 4208-4448

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Serial No.: 12/203,746 Confirmation No.: 3717  
Applicant(s): Pertti TOLONEN Group Art Unit: 2614  
Examiner: UNASSIGNED  
Filed: September 3, 2008  
Customer No.: 27123  
For: SOFTWARE DEFINED RADIO CONFIGURATION

**RESPONSE TO "NOTICE TO FILE MISSING PARTS"**

Mail Stop Missing Parts  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

In response to the NOTICE TO FILE MISSING PARTS OF APPLICATION--FILING DATE GRANTED dated September 19, 2008, Applicant(s) submit(s) herewith the following documents for appropriate action by the U.S. Patent and Trademark Office:

- ☐ Copy of Notice to File Missing Parts
- ☒ Executed Declaration
- ☐ Application Filing Fees
- ☐
- ☒ Please charge the required fee of \$130.00 to deposit account no. 13-4500, Order No. 4208-4448.
- ☐ A check in the amount of \$\_\_\_\_\_ in payment of the application filing fees is attached.
- ☒ The Commissioner is hereby authorized to charge any additional fees which may be required by this paper, or credit any overpayment to Deposit Account No. 13-4500, Order No. 4208-4448. A DUPLICATE COPY OF THIS SHEET IS ATTACHED.

Respectfully submitted,  
MORGAN & FINNEGAN, L.L.P.

Dated: November 19, 2008

By: 

Elliot L. Frank

Registration No. 56,641

Correspondence Address:

Address Associated With Customer Number:  
27123

(202) 857-7887 Telephone  
(202) 857-7929 Facsimile

Docket No. 4208-4448

**COMBINED DECLARATION AND POWER OF ATTORNEY FOR  
ORIGINAL, DESIGN, NATIONAL STAGE OF PCT, SUPPLEMENTAL,  
DIVISIONAL, CONTINUATION OR CONTINUATION-IN-PART APPLICATION**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

SOFTWARE-DEFINED RADIO CONFIGURATION

the specification of which

- a. ☐ is attached hereto
- b. ☒ was filed on September 3, 2008 as application Serial No. 12/203,746 and was amended on . (if applicable).

**PCT FILED APPLICATION ENTERING NATIONAL STAGE**

- c. ☐ was described and claimed in International Application No. filed on and as amended on . (if any).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 C.F.R. § 1.56.

I hereby specify the following as the correspondence address to which all communications about this application are to be directed:

**SEND CORRESPONDENCE TO:**

- ☒ The address associated with the Customer Number
- OR-
- ☐ Address Shown (see below)

**27123**

**DIRECT TELEPHONE CALLS TO:**

Elliot L. Frank, Esq.

Docket No. 4208-4448

- ☐ I hereby claim foreign priority benefits under Title 35, United States Code § 119 (a)-(d) or under § 365(b) of any foreign application(s) for patent or inventor's certificate or under § 365(a) of any PCT international application(s) designating at least one country other than the U.S. listed below and also have identified below such foreign application(s) for patent or inventor's certificate or such PCT international application(s) filed by me on the same subject matter having a filing date within twelve (12) months before that of the application on which priority is claimed:
- ☐ The attached 35 U.S.C. § 119 claim for priority for the application(s) listed below forms a part of this declaration.

Country/PCT	Application Number	Date of filing (day, month, yr)	Date of issue (day, month, yr)	Priority Claimed
				<input type="checkbox"/> Y <input type="checkbox"/> N
				<input type="checkbox"/> Y <input type="checkbox"/> N
				<input type="checkbox"/> Y <input type="checkbox"/> N

- ☐ I hereby claim the benefit under 35 U.S.C. § 119(e) of any U.S. provisional application(s) listed below.

Provisional Application No.	Date of filing (day, month, yr)

**ADDITIONAL STATEMENTS FOR DIVISIONAL,  
CONTINUATION OR CONTINUATION-IN-PART  
OR PCT APPLICATION(S) DESIGNATING THE U.S.**

I hereby claim the benefit under Title 35, United States Code § 120 of any United States application(s) or under § 365(c) of any PCT international application(s) designating the U.S. listed below.

US/PCT Application Serial No.	Filing Date	Status (patented, pending, abandoned)/ U.S. application no. assigned (For PCT)

US/PCT Application Serial No.	Filing Date	Status (patented, pending, abandoned)/ U.S. application no. assigned (For PCT)

- ☐ In this continuation-in-part application, insofar as the subject matter of any of the claims of this application is not disclosed in the above listed prior United States or PCT international application(s) in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application.

Docket No. 4208-4448

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or Imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I hereby appoint:

☒ Practitioners associated with the Customer Number

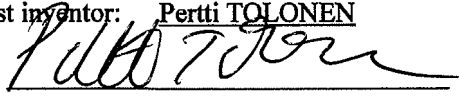
27123
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-OR-

☐ Practitioner(s) named below:

Name	Registration Number

☒ I hereby authorize the U.S. attorneys and/or agents named hereinabove to accept and follow instructions from a s to any action to be taken in the U.S. Patent and Trademark Office regarding this application without direct communication between the U.S. attorneys and/or agents and me. In the event of a change in the person(s) from whom instructions may be taken I will so notify the U.S. attorneys and/or agents named hereinabove.

Full name of sole or first inventor: Pertti TOLONENInventor's signature\* 6.11.2008

Date

Residence: Aatelikuja 1ACitizenship: FIPost Office Address: Aatelikuja 1A, Vantaa 01520 FI

Full name of second inventor: \_\_\_\_\_

Inventor's signature\* \_\_\_\_\_

Date

Residence: \_\_\_\_\_

Citizenship: \_\_\_\_\_

Post Office Address: \_\_\_\_\_

☐ ATTACHED IS ADDED PAGE TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR SIGNATURE BY THIRD AND SUBSEQUENT INVENTORS FORM.



## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	12203746			
<b>Filing Date:</b>	03-Sep-2008			
<b>Title of Invention:</b>	SOFTWARE-DEFINED RADIO CONFIGURATION			
<b>First Named Inventor/Applicant Name:</b>	Pertti TOLONEN			
<b>Filer:</b>	Elliot Lyle Frank/Jacqueline Brooking			
<b>Attorney Docket Number:</b>	4208-4448			
Filed as Large Entity				
<b>Utility under 35 USC 111(a) Filing Fees</b>				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Basic Filing:</b>				
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
Late filing fee for oath or declaration	1051	1	130	130
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
<b>Extension-of-Time:</b>				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Total in USD (\$)				130

**Electronic Acknowledgement Receipt**

<b>EFS ID:</b>	4320785
<b>Application Number:</b>	12203746
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	3717
<b>Title of Invention:</b>	SOFTWARE-DEFINED RADIO CONFIGURATION
<b>First Named Inventor/Applicant Name:</b>	Pertti TOLONEN
<b>Customer Number:</b>	27123
<b>Filer:</b>	Elliot Lyle Frank/Jacqueline Brooking
<b>Filer Authorized By:</b>	Elliot Lyle Frank
<b>Attorney Docket Number:</b>	4208-4448
<b>Receipt Date:</b>	19-NOV-2008
<b>Filing Date:</b>	03-SEP-2008
<b>Time Stamp:</b>	18:53:44
<b>Application Type:</b>	Utility under 35 USC 111(a)

**Payment information:**

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$130
RAM confirmation Number	3939
Deposit Account	134500
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

**File Listing:**

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Applicant Response to Pre-Exam Formalities Notice	4208-4448MSPRESP.pdf	42185 bf0cae83feec62ac900712ed7cf0930b57e733	no	1

**Warnings:****Information:**

2	Oath or Declaration filed	4208-4448execDEC.pdf	129500 3fbb83ee47c571ff678f097bfff8b2c4c8aca6887	no	3
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**Warnings:****Information:**

3	Fee Worksheet (PTO-06)	fee-info.pdf	30146 be8126f3345dca26ffb78cdc1eeadd3e8d42e89d	no	2
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**Warnings:****Information:****Total Files Size (in bytes):**

201831

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

**New Applications Under 35 U.S.C. 111**

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
**United States Patent and Trademark Office**  
 Address: COMMISSIONER FOR PATENTS  
 P.O. Box 1450  
 Alexandria, Virginia 22313-1450  
 www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
12/203,746	09/03/2008	2614	2660	4208-4448	29	8

CONFIRMATION NO. 3717

## UPDATED FILING RECEIPT



\*OC000000033312878\*

27123  
 MORGAN & FINNEGAN, L.L.P.  
 3 WORLD FINANCIAL CENTER  
 NEW YORK, NY 10281-2101

Date Mailed: 11/28/2008

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

**Applicant(s)**

Pertti TOLONEN, Aatelikuja 1A, FINLAND;

**Assignment For Published Patent Application**

NOKIA CORPORATION, Espoo, FINLAND

**Power of Attorney:** The patent practitioners associated with Customer Number 27123**Domestic Priority data as claimed by applicant****Foreign Applications****If Required, Foreign Filing License Granted:** 09/15/2008

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/203,746**

**Projected Publication Date:** 03/04/2010**Non-Publication Request:** No**Early Publication Request:** No

**Title**

SOFTWARE-DEFINED RADIO CONFIGURATION

**Preliminary Class**

379

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#### **NOT GRANTED**

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UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office  
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P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NUMBER	PATENT NUMBER	GROUP ART UNIT	FILE WRAPPER LOCATION
12/203,746		2617	



**Correspondence Address/Fee Address Change**

The following fields have been set to Customer Number 85775 on 03/30/2009

- Correspondence Address
- Maintenance Fee Address
- Power of Attorney Address

The address of record for Customer Number 85775 is:

85775  
Locke Lord Bissell & Liddell LLP  
Attn: IP Docketing  
Three World Financial Center  
New York, NY 10281-2101



Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (07-09)

Approved for use through 07/31/2012. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		12203746	
	Filing Date		2008-09-03	
	First Named Inventor	Pertti TOLONEN		
	Art Unit	2614		
	Examiner Name	Unassigned		
	Attorney Docket Number	1004289.386US (4208-4448)		

U.S.PATENTS							Remove
Examiner Initial*	Cite No	Patent Number	Kind Code <sup>1</sup>	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	
	1						

If you wish to add additional U.S. Patent citation information please click the Add button.

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U.S.PATENT APPLICATION PUBLICATIONS							Remove
Examiner Initial*	Cite No	Publication Number	Kind Code <sup>1</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	
	1	20040023652	A1	2004-02-05	Shah et al.		
	2	20050053094	A1	2005-03-10	Cain et al.		
	3	20060073804	A1	2006-04-06	Tanaka et al.		
	4	20070263709	A1	2007-11-15	Kasslin et al.		

If you wish to add additional U.S. Published Application citation information please click the Add button.

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FOREIGN PATENT DOCUMENTS								Remove
Examiner Initial*	Cite No	Foreign Document Number <sup>3</sup>	Country Code <sup>2</sup> ;	Kind Code <sup>4</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T <sup>5</sup>

**INFORMATION DISCLOSURE  
STATEMENT BY APPLICANT**  
( Not for submission under 37 CFR 1.99)

Application Number	12203746
Filing Date	2008-09-03
First Named Inventor	Pertti TOLONEN
Art Unit	2614
Examiner Name	Unassigned
Attorney Docket Number	1004289.386US (4208-4448)

	1							<input type="checkbox"/>
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If you wish to add additional Foreign Patent Document citation information please click the Add button

**NON-PATENT LITERATURE DOCUMENTS**

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>5</sup>
	1	International Search Report for PCT/FI2009/050698 mailed December 4, 2009, 7pp.	<input type="checkbox"/>

If you wish to add additional non-patent literature document citation information please click the Add button

**EXAMINER SIGNATURE**

Examiner Signature		Date Considered	
--------------------	--	-----------------	--

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup> See Kind Codes of USPTO Patent Documents at [www.USPTO.GOV](http://www.USPTO.GOV) or MPEP 901.04. <sup>2</sup> Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>3</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>4</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>5</sup> Applicant is to place a check mark here if English language translation is attached.

**INFORMATION DISCLOSURE  
STATEMENT BY APPLICANT**  
( Not for submission under 37 CFR 1.99)

Application Number	12203746		
Filing Date	2008-09-03		
First Named Inventor	Pertti TOLONEN		
Art Unit	2614		
Examiner Name	Unassigned		
Attorney Docket Number	1004289.386US (4208-4448)		

**CERTIFICATION STATEMENT**

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Elliot L. Frank/	Date (YYYY-MM-DD)	2009-12-14
Name/Print	Elliot L. Frank	Registration Number	56,641

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

## Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

## PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:  
 NOKIA CORPORATION  
 IPR Department  
 Virpi Tognetty  
 Keilalahdentie 4  
 FI-02150 ESPOO  
 FINLAND

**PCT**

NOTIFICATION OF TRANSMITTAL OF  
 THE INTERNATIONAL SEARCH REPORT AND  
 THE WRITTEN OPINION OF THE INTERNATIONAL  
 SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing ( <i>day/month/year</i> ) 04 December 2009 (04.12.2009)	
Applicant's or agent's file reference NC65164WO	<b>FOR FURTHER ACTION</b> See paragraphs 1 and 4 below
International application No. PCT/FI2009/050698	International filing date ( <i>day/month/year</i> ) 02 September 2009 (02.09.2009)
Applicant NOKIA CORPORATION et al.	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.
- Filing of amendments and statement under Article 19:**  
 The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):
- When?** The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.
- Where?** Directly to the International Bureau of WIPO, 34 chemin des Colombettes  
 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70
- For more detailed instructions,** see the notes on the accompanying sheet.
2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.
3. ☐ **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:
- ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.
- ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.
4. **Reminders**
- Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.
- The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.
- Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.
- In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.
- See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the ISA/FI National Board of Patents and Registration of Finland P.O. Box 1160, FI-00101 HELSINKI, Finland Facsimile No. +358 9 6939 5328	Authorized officer Pasi Suvikunnas Telephone No. +358 9 6939 500
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## NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under Article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the *PCT Applicant's Guide*, a publication of WIPO.

In these Notes, "Article," "Rule" and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions, respectively.

### INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report and the written opinion of the International Searching Authority, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only (see *PCT Applicant's Guide*, Volume I/A, Annexes B1 and B2).

The attention of the applicant is drawn to the fact that amendments to the claims under Article 19 are not allowed where the International Searching Authority has declared, under Article 17(2), that no international search report would be established (see *PCT Applicant's Guide*, Volume I/A, paragraph 296).

#### **What parts of the international application may be amended ?**

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Preliminary Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

**When ?** Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

#### **Where not to file the amendments ?**

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

**How ?** Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Section 205(b)).

**The amendments must be made in the language in which the international application is to be published.**

#### **What documents must/may accompany the amendments ?**

##### **Letter (Section 205(b)):**

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

**The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.**

**NOTES TO FORM PCT/ISA/220 (continued)**

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

- (i) the claim is unchanged;
- (ii) the claim is cancelled;
- (iii) the claim is new;
- (iv) the claim replaces one or more claims as filed;
- (v) the claim is the result of the division of a claim as filed.

**The following examples illustrate the manner in which amendments must be explained in the accompanying letter:**

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:  
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11]:  
"Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:  
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or  
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]:  
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

**"Statement under Article 19(1)" (Rule 46.4)**

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

**It must be in the language in which the international application is to be published.**

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

**Consequence if a demand for international preliminary examination has already been filed**

If, at the time of filing any amendments and any accompanying statement, under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the time of filing the amendments (and any statement) with the International Bureau, also file with the International Preliminary Examining Authority a copy of such amendments (and of any statement) and, where required, a translation of such amendments for the procedure before that Authority (see Rules 55.3(a) and 62.2, first sentence). For further information, see the Notes to the demand form (PCT/IPEA/401).

If a demand for international preliminary examination is made, the written opinion of the International Searching Authority will, except in certain cases where the International Preliminary Examining Authority did not act as International Searching Authority and where it has notified the International Bureau under Rule 66.1*bis*(b), be considered to be a written opinion of the International Preliminary Examining Authority. If a demand is made, the applicant may submit to the International Preliminary Examining Authority a reply to the written opinion together, where appropriate, with amendments before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later (Rule 43*bis*.1(c)).

**Consequence with regard to translation of the international application for entry into the national phase**

The applicant's attention is drawn to the fact that, upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see the *PCT Applicant's Guide*, Volume II.

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference NC65164WO	<b>FOR FURTHER ACTION</b>		see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/FI2009/050698	International filing date ( <i>day/month/year</i> ) 02 September 2009 (02.09.2009)	(Earliest) Priority Date ( <i>day/month/year</i> ) 03 September 2008 (03.09.2008)	
Applicant NOKIA CORPORATION et al.			

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of:

☒ the international application in the language in which it was filed.

☐ a translation of the international application into \_\_\_\_\_ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (see Box No. II).

3. ☐ **Unity of invention is lacking** (see Box No. III).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

a. the figure of the **drawings** to be published with the abstract is Figure No. 13

☐ as suggested by the applicant.

☒ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

b. ☐ none of the figures is to be published with the abstract.



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI2009/050698

## A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: H04B, H04W, H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

FI, SE, NO, DK

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, WPI, INSPEC

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2007263709 A1 (KASSLIN M. et al.) 15 November 2007 (15.11.2007) abstract; paragraphs [0010] and [0011]	1-29
A	US 2005053094 A1 (CAIN J. B. et al.) 10 March 2005 (10.03.2005) abstract; paragraphs [0012]–[0021]	1-29
A	US 2004023652 A1 (SHAH Y. et al.) 05 February 2004 (05.02.2004) abstract; paragraphs [0017]–[0024]	1-29
A	US 2006073804 A1 (TANAKA H. et al.) 06 April 2006 (06.04.2006) abstract; paragraphs [0013] and [0014]	1-29



Further documents are listed in the continuation of Box C.



See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search

01 December 2009 (01.12.2009)

Date of mailing of the international search report

04 December 2009 (04.12.2009)

Name and mailing address of the ISA/FI  
National Board of Patents and Registration of Finland  
P.O. Box 1160, FI-00101 HELSINKI, Finland

Facsimile No. +358 9 6939 5328

Authorized officer

Pasi Suvikunnas

Telephone No. +358 9 6939 500

**INTERNATIONAL SEARCH REPORT**  
**Information on patent family members**

International application No.  
PCT/FI2009/050698

Patent document cited in search report	Publication date	Patent family members(s)	Publication date
US 2007263709 A1	15/11/2007	CN 101444006 A	27/05/2009
		CA 2646905 A1	22/11/2007
		EP 2016682 A2	21/01/2009
		AU 2007251294 A1	22/11/2007
		WO 2007132319 A2	22/11/2007
.....			
US 2005053094 A1	10/03/2005	TW 248769B B	01/02/2006
		CN 1857013 A	01/11/2006
		KR 20060052999 A	19/05/2006
		EP 1665834 A1	07/06/2006
		CA 2538244 A1	24/03/2005
WO 2005027543 A1	24/03/2005		
.....			
US 2004023652 A1	05/02/2004	AT 431688T T	15/05/2009
		TW 269596B B	21/12/2006
		WO 2004012464 A2	05/02/2004
		EP 1527633 A2	04/05/2005
		AU 2003254245 A1	16/02/2004
.....			
US 2006073804 A1	06/04/2006	JP 2006108953 A	20/04/2006
.....			

INTERNATIONAL SEARCH REPORT

International application No.  
PCT/FI2009/050698

CLASSIFICATION OF SUBJECT MATTER

Int.Cl.

**H04B 1/00** (2006.01)

**H04W 72/04** (2009.01)

**Electronic Acknowledgement Receipt**

<b>EFS ID:</b>	6632520
<b>Application Number:</b>	12203746
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	3717
<b>Title of Invention:</b>	SOFTWARE-DEFINED RADIO CONFIGURATION
<b>First Named Inventor/Applicant Name:</b>	Pertti TOLONEN
<b>Customer Number:</b>	85775
<b>Filer:</b>	Elliot Lyle Frank/Amy Triplett
<b>Filer Authorized By:</b>	Elliot Lyle Frank
<b>Attorney Docket Number:</b>	4208-4448
<b>Receipt Date:</b>	16-DEC-2009
<b>Filing Date:</b>	03-SEP-2008
<b>Time Stamp:</b>	11:21:25
<b>Application Type:</b>	Utility under 35 USC 111(a)

**Payment information:**

Submitted with Payment	no
------------------------	----

**File Listing:**

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Filed (SB/08)	42084448_Form__SB_08a.pdf	788126 36b6b1e0a8fa5ac888280ddc7d7f7c335e6c5a30	no	4

**Warnings:****Information:**

2	NPL Documents	42084448_NPL.pdf	104542 0a55c1772cc2881625a890a4c24e0ee8c3f4 eaa1	no	7
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>				892668	
<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</b></p>					



## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
**United States Patent and Trademark Office**  
 Address: COMMISSIONER FOR PATENTS  
 P.O. Box 1450  
 Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/203,746	09/03/2008	Pertti TOLONEN	4208-4448

CONFIRMATION NO. 3717

## PUBLICATION NOTICE



\*OC000000040417722\*

85775  
 Locke Lord Bissell & Liddell LLP  
 Attn: IP Docketing  
 Three World Financial Center  
 New York, NY 10281-2101

**Title:** SOFTWARE-DEFINED RADIO CONFIGURATION

**Publication No.** US-2010-0056200-A1

**Publication Date:** 03/04/2010

## NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at [www.uspto.gov](http://www.uspto.gov). The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at [www.uspto.gov](http://www.uspto.gov) using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently <http://pair.uspto.gov/>. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



**UNITED STATES PATENT AND TRADEMARK OFFICE**

UNITED STATES DEPARTMENT OF COMMERCE  
**United States Patent and Trademark Office**  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NUMBER	PATENT NUMBER	GROUP ART UNIT	FILE WRAPPER LOCATION
12/203,746		2618	



**Correspondence Address/Fee Address Change**

The following fields have been set to Customer Number 10928 on 11/17/2010

- Correspondence Address
- Power of Attorney Address

The address of record for Customer Number 10928 is:

10928  
Locke Lord Bissell & Liddell  
IP Docket Department  
3 World Financial Center  
New York, NY 10281-2101



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NUMBER	PATENT NUMBER	GROUP ART UNIT	FILE WRAPPER LOCATION
12/203,746		2618	



**Correspondence Address/Fee Address Change**

The following fields have been set to Customer Number 10928 on 12/28/2010

- Correspondence Address
- Power of Attorney Address

The address of record for Customer Number 10928 is:

10928  
Locke Lord Bissell & Liddell  
IP Docket Department  
3 World Financial Center  
New York, NY 10281-2101





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APPLICATION NUMBER	PATENT NUMBER	GROUP ART UNIT	FILE WRAPPER LOCATION
12/203,746		2618	



**Correspondence Address/Fee Address Change**

The following fields have been set to Customer Number 10928 on 02/07/2011

- Correspondence Address
- Power of Attorney Address

The address of record for Customer Number 10928 is:

10928  
Locke Lord Bissell & Liddell  
IP Docket Department  
3 World Financial Center  
New York, NY 10281-2101



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/203,746	09/03/2008	Pertti TOLONEN	1004289.386US (4208-4448)	3717
10928	7590	08/15/2011	EXAMINER	
Locke Lord Bissell & Liddell IP Docket Department 3 World Financial Center New York, NY 10281-2101			NGUYEN, SIMON	
			ART UNIT	PAPER NUMBER
			2618	
			NOTIFICATION DATE	DELIVERY MODE
			08/15/2011	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ptopatentcommunication@lockelord.com  
 Shopkins@lockelord.com  
 Jmedina@lockelord.com


<b>Search Notes</b>  	<b>Application/Control No.</b>  12203746	<b>Applicant(s)/Patent Under Reexamination</b>  TOLONEN, PERTTI
	<b>Examiner</b>  SIMON NGUYEN	<b>Art Unit</b>  2618

SEARCHED			
Class	Subclass	Date	Examiner
455	517, 552.1-553.1, 556.1-556.2	8/3/11	SN

SEARCH NOTES		
Search Notes	Date	Examiner
EAST	8/3/11	SN

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

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<b><i>Index of Claims</i></b>  	<b>Application/Control No.</b>  12203746	<b>Applicant(s)/Patent Under Reexamination</b>  TOLONEN, PERTTI
	<b>Examiner</b>  SIMON NGUYEN	<b>Art Unit</b>  2618

✓	<b>Rejected</b>	-	<b>Cancelled</b>	N	<b>Non-Elected</b>	A	<b>Appeal</b>
=	<b>Allowed</b>	÷	<b>Restricted</b>	I	<b>Interference</b>	O	<b>Objected</b>

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant		<input type="checkbox"/> CPA		<input type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47			
CLAIM		DATE							
Final	Original	08/04/2011							
	1	✓							
	2	✓							
	3								
	4	✓							
	5	✓							
	6	✓							
	7	✓							
	8	✓							
	9	✓							
	10	✓							
	11	O							
	12	✓							
	13	✓							
	14	✓							
	15	✓							
	16	✓							
	17	✓							
	18	✓							
	19	O							
	20	✓							
	21	✓							
	22	✓							
	23	✓							
	24	✓							
	25	✓							
	26	✓							
	27	✓							
	28	✓							
	29	✓							

<b>Office Action Summary</b>	<b>Application No.</b> 12/203,746	<b>Applicant(s)</b> TOLONEN, PERTTI
	<b>Examiner</b> SIMON NGUYEN	<b>Art Unit</b> 2618

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 03 September 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-10,12-18 and 20-29 is/are rejected.
- 7) ☒ Claim(s) 3,11 and 19 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 September 2008 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |  |
|---|--|
| <p>1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)</p> <p>2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)</p> <p>3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br/>Paper No(s)/Mail Date _____.</p> | <p>4) <input type="checkbox"/> Interview Summary (PTO-413)<br/>Paper No(s)/Mail Date. _____.</p> <p>5) <input type="checkbox"/> Notice of Informal Patent Application</p> <p>6) <input type="checkbox"/> Other: _____.</p> |
|---|--|

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## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-2, 4-10, 12-18, 20-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abe et al. (US 2008/0200195 A1) in view of Nasu et al. (US 2004/0266404 A1).

Regarding claim 1, Abe discloses a method for reconfiguring resources in a mobile communication system (abstract, fig.1-3), comprising: receiving (collecting) characteristic information into an apparatus (multimode control station 101) , wherein the collected or received characteristic information corresponding to at least one other apparatus (any intended wireless devices (for example, device 102 of 102-105, abstract, paragraphs 22-23, 25, 64, 77, 83, 84, 102, 149, 257-258); determining local characteristic information and formulating a configuration (reconfiguration) based on the collected characteristic information such as a resource allocation, a quality estimating, a communication link parameter, and a scheme selection (fig.2, paragraphs 76-88); sending (reporting) the configuration from the multimode control station 101 to the intended apparatus such as device 102 (figs. 1-3, paragraphs 23, 93, 199); implementing the configuration such that reconfiguration the resource allocation, the

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communication link parameter, the scheme selection (paragraphs 76-88); and establishing communication between the multimode control station 101 with the intended wireless device 102 (figs. 1-3, paragraphs 14, 97). however, Abe failed to teach the multimode control station initially inquiries information from one of the other devices 102-105.

Nasu discloses a method for establishing a connection between a headset (2) or a wireless camera (5) to wireless devices 1a-1b (figs. 1a-c, 2a-2b) or printers 6a-c, respectively, the method comprising: the headset or camera initially inquires information about the wireless devices 1a-1b, the wireless devices sends the requested information, in response, to the headset; and based on the response, a communication link is established between the headset and one of the device 1a (abstract, paragraphs 16-21, 24-25, 105, 113, 114, 121-125). Therefore, it would have been obviously to one skilled in the art at the time the invention was made to have Abe, modified by Nasu by having the multimode control station 101 as taught by Abe to send an inquiry to any of other wireless devices prior to establish a communication.

Regarding claim 9, this claim is rejected for the same reason as set forth in claim 1, wherein a computer program for executing the method step is inherently in Abe.

Regarding claim 17, this claim is rejected for the same reason as set forth in claim 1 as apparatus of the method claim 1. Wherein Abe further discloses a reconfigurable digital signal processing section 10123 as a software-defined radio module and processing section 1016 as a processor for processing the control station (fig.2).

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Regarding claim 25, this claim is rejected for the same reason as set forth in claim 1, as means of the method claim 1.

Regarding claims 2, 10, 18, Nasu discloses the headset as a source device sending out the inquiry signal (abstract, fig. 1a-c, 25), wherein the inquiry signal sent from the source to a destination device is considered as an initialization channel that is known to those skilled in the art.

Regarding claims 4, 12, 20, Abe further discloses the collected characteristic information and the local characteristic information comprise interference information (paragraphs 18-19, 23-24, 263, 265, 277, 279, 280-281, 283, 304), a power status (paragraphs 279-283, 318, 328, 335-336). However, Abe failed to teach the local characteristic information comprises load information. It should be noted that the local characteristic information including a load information in the apparatus in the determination to establish a connection is known to those skilled in the art.

Regarding claims 5, 13, 21, Abe discloses the establishing of the connection via a wireless transport based on the collected information received by the wireless devices (102-105) and the local information in the apparatus 101 such as the scheme selection, the resource allocation, a QoS parameter (figs. 1-3, abstract, paragraphs 76-88).

Regarding claims 6-7, 14-15, 22-23, Abe discloses the configuration is reported or sent to other devices (102-105) (figs. 1-3, paragraphs 23, 93, 199), wherein the report of the configuration sent in an initialization channel is known to those skilled in the art.



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It should be noted that Abe discloses the multimode control station 101 communication to different devices 102-105 based on a request connection from the devices 102-105, which means that the multimode control station can connect or disconnect from these devices which is known to those skilled in the art. It is also noted that prior to establish a connection to transmit/receive data or voice, the two communication devices use an initialization channel to commute which is also known to those skilled in the art.

Regarding claims 8, 16, 24, Abe discloses that prior to establish the communication between a multimode control station 101 to one of devices 102-105 for transmitting/receiving data and voice on a traffic channel, Abe discloses the collecting information from one of the devices, wherein the collecting information is performed on different channel than the traffic channel which is known to those skilled in the art.

Regarding claim 26, this claim is rejected for the same reason as set forth in claim 1 but in a reverse position, wherein an apparatus is a multimode terminal station 102 (fig.3), comprising: receiving wireless communication in the multimode terminal station; determining characteristic information in the multimode terminal station; receiving (by reporting) a reconfiguration from multimode control station; implementing the configuration by reconfiguration DSP section 10223; and establishing communication in accordance with the configuration (figs. 1-3, paragraphs 65-66, 69, 91-99, 110, 119, 129, 185-187, 319, 324, 341), wherein Abe further discloses a request for connection between the multimode terminal station and the multimode control station (paragraphs 199, 289, 313). However, Abe fails to teach receiving an inquiry.

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Nasu discloses a method for establishing a connection between wireless devices 1a-1b (figs. 1a-c, 2a-2b) and a headset, wherein the wireless devices receive an inquiry from the headset, the wireless devices sends the required information, in response, to the headset; and based on the response, a communication link is established between the headset and one of the device 1a (abstract, paragraphs 16-21, 24-25, 105, 113, 114, 121-125). Therefore, it would have been obviously to one skilled in the art at the time the invention was made to have Abe, modified by Nasu by having the multimode control station 101 as taught by Abe to send an inquiry to any of other wireless devices prior to establish a communication.

Regarding claims 28-29, these claims are rejected for the same reason as set forth in claim 26 as means and apparatus of method claim 26.

Regarding claim 27, this claim is rejected for the same reason as set forth in claim 26, wherein a computer program for executing the method step is inherently in the systems of Abe and Nasu.

### ***Allowable Subject Matter***

3. Claims 3, 11, and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claims 3, 11, 19, Abe further discloses the collected characteristic information and the local characteristic information comprise interference information (paragraphs 18-19, 23-24, 263, 265, 277, 279, 280-281, 283, 304), a power status

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(paragraphs 279-283, 318, 328, 335-336). However, Abe failed to teach the collected characteristic information comprises load information.

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Simon Nguyen whose telephone number is (571) 272-7894. The examiner can normally be reached on Monday-Friday from 7:00 AM to 6:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duc M. Nguyen can be reached on (571) 272-7503. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

August 4, 2011

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/SIMON D NGUYEN/

Primary Examiner, Art Unit 2618

<b>Notice of References Cited</b>	Application/Control No. 12/203,746		Applicant(s)/Patent Under Reexamination TOLONEN, PERTTI	
	Examiner SIMON NGUYEN		Art Unit 2618	Page 1 of 1

**U.S. PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2008/0200195	08-2008	Abe et al.	455/501
*	B	US-2004/0266404	12-2004	Nasu et al.	455/414.1
*	C	US-2007/0190938	08-2007	Hillyard, Jason	455/041.1
*	D	US-2008/0261605	10-2008	Larsen, James David	455/446
*	E	US-2005/0094589	05-2005	Camp, William O. JR.	370/318
*	F	US-2007/0115950	05-2007	Karaoguz et al.	370/356
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

**FOREIGN PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

**NON-PATENT DOCUMENTS**

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (07-09)

Approved for use through 07/31/2012. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		12203746	
	Filing Date		2008-09-03	
	First Named Inventor	Pertti TOLONEN		
	Art Unit	2614		
	Examiner Name	Unassigned		
	Attorney Docket Number	1004289.386US (4208-4448)		

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Examiner Initial*	Cite No	Publication Number	Kind Code <sup>1</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	
/SN/	1	20040023652	A1	2004-02-05	Shah et al.		
/SN/	2	20050053094	A1	2005-03-10	Cain et al.		
/SN/	3	20060073804	A1	2006-04-06	Tanaka et al.		
/SN/	4	20070263709	A1	2007-11-15	Kasslin et al.		

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**INFORMATION DISCLOSURE  
STATEMENT BY APPLICANT**  
( Not for submission under 37 CFR 1.99)

Application Number	12203746
Filing Date	2008-09-03
First Named Inventor	Pertti TOLONEN
Art Unit	2614
Examiner Name	Unassigned
Attorney Docket Number	1004289.386US (4208-4448)

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>5</sup>
/SN/	1	International Search Report for PCT/FI2009/050698 mailed December 4, 2009, 7pp.	<input type="checkbox"/>

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**EXAMINER SIGNATURE**

Examiner Signature	/Simon Nguyen/	Date Considered	06/24/2011
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\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup> See Kind Codes of USPTO Patent Documents at [www.USPTO.GOV](http://www.USPTO.GOV) or MPEP 901.04. <sup>2</sup> Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>3</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>4</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>5</sup> Applicant is to place a check mark here if English language translation is attached.

**EAST Search History****EAST Search History (Prior Art)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	4	("20080200195" or "20080261605" or "20040266404" or "20070190938").pn.	US-PGPUB; USPAT	OR	OFF	2011/08/03 17:13
L2	2	1 and inquir\$3	US-PGPUB; USPAT	OR	OFF	2011/08/03 17:18
L3	2	2 and (configuration or configur\$3)	US-PGPUB; USPAT	OR	OFF	2011/08/03 17:18
L4	2933	inquir\$3 same (establish\$3 near7 (link or communicat\$3 or connect\$3))	US-PGPUB; USPAT	OR	OFF	2011/08/03 17:26
L5	2210	4 and (configur\$3 or configuration or reconfigur\$3 or reconfiguration)	US-PGPUB; USPAT	OR	OFF	2011/08/03 17:27
L6	172	5 and (multimode or ((multi\$3 or plurality) adj2 (mode or system)))	US-PGPUB; USPAT	OR	OFF	2011/08/03 17:28
L7	74	6 and ((receiv\$3 or transmit\$4 or report\$3 or send\$3) near7 (configur\$3 or configuration))	US-PGPUB; USPAT	OR	OFF	2011/08/03 17:29
L8	145729	"455"/\$.ccls.	US-PGPUB; USPAT	OR	OFF	2011/08/03 17:29
L9	21	7 and 8	US-PGPUB; USPAT	OR	OFF	2011/08/03 17:29
L10	155139	"370"/\$.ccls.	US-PGPUB; USPAT	OR	OFF	2011/08/03 17:29
L11	22	7 and 10	US-PGPUB; USPAT	OR	OFF	2011/08/03 17:29
L12	68757	9 ro 11	US-PGPUB; USPAT	OR	OFF	2011/08/03 17:29
L13	36	9 or 11	US-PGPUB; USPAT	OR	OFF	2011/08/03 17:29
L14	36	13 and inquir\$3	US-PGPUB; USPAT	OR	OFF	2011/08/03 17:33
L15	297	4 same (configur\$3 or configuration or reconfigur\$3 or reconfiguration)	US-PGPUB; USPAT	OR	OFF	2011/08/03 17:50
L16	105	15 same ((receiv\$3 or transmit\$4 or report\$3 or send\$3) near7 (configur\$3 or	US-PGPUB;	OR	OFF	2011/08/03 17:50



		configuration))	USPAT			
L17	45	16 and (8 or 10)	US- PGPUB; USPAT	OR	OFF	2011/08/03 17:51
L18	42	17 not 13	US- PGPUB; USPAT	OR	OFF	2011/08/03 17:51

8/ 3/ 2011 6:17:49 PM

**EAST Search History****EAST Search History (Prior Art)**

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L3	24	("20020054097"   "20020082022"   "20020119788"   "20020143930"   "20020145984"   "20040010404"   "20050064856"   "20050064877"   "20050114800"   "20050181808"   "20050203757"   "20050221841"   "20060089792"   "20060107219"   "20060135067"   "20060154605"   "20060258368"   "6415220"   "6484029"   "6539230"   "6750813"   "6879838"   "6931130"   "6963749").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/08/01 14:46
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L5	232	inquir\$3 and SDR	US-PGPUB; USPAT; USOCR	OR	ON	2011/08/01 15:10
L6	152	5 and (receiv\$3 near7 information)	US-PGPUB; USPAT; USOCR	OR	ON	2011/08/01 15:10
L7	144	6 and (adjust\$3 or (configur\$3 or configuration))	US-PGPUB; USPAT; USOCR	OR	ON	2011/08/01 15:11

L8	158519	"455"/\$.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2011/08/01 15:11
L9	15	7 and 8	US-PGPUB; USPAT; USOCR	OR	ON	2011/08/01 15:11
L10	16	7 and (short adj2 range)	US-PGPUB; USPAT; USOCR	OR	ON	2011/08/01 15:19
L11	6492	initia\$4 with inquir\$3	US-PGPUB; USPAT; USOCR	OR	ON	2011/08/01 15:27
L12	19	11 and SDR	US-PGPUB; USPAT; USOCR	OR	ON	2011/08/01 15:27
L13	177744	initia\$4 with (requirement or inquir \$3 or request\$4)	US-PGPUB; USPAT; USOCR	OR	ON	2011/08/01 15:29
L14	622	13 and SDR	US-PGPUB; USPAT; USOCR	OR	ON	2011/08/01 15:29
L15	49	14 and ((long adj2 range) same (short adj2 range))	US-PGPUB; USPAT; USOCR	OR	ON	2011/08/01 15:30
L16	41	15 not (10 or 12)	US-PGPUB; USPAT; USOCR	OR	ON	2011/08/01 15:30
L17	3	8 and 16	US-PGPUB; USPAT; USOCR	OR	ON	2011/08/01 15:30
L18	159350	"370"/\$.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2011/08/01 15:31
L19	8	16 and 18	US-PGPUB; USPAT; USOCR	OR	ON	2011/08/01 15:31
L20	82	((configur\$3 or configuration) with resource) same SDR	US-PGPUB; USPAT; USOCR	OR	ON	2011/08/01 15:33
L21	27	20 and (receiv\$3 with information)	US-PGPUB; USPAT; USOCR	OR	ON	2011/08/01 15:34
L22	8	1 or 2	US-PGPUB; USPAT	OR	ON	2011/08/01 15:39
L23	5	22 and (request\$3 or inquir\$3)	US-PGPUB; USPAT	OR	ON	2011/08/01 15:39

L24	3	23 and ((local or area) near6 information)	US-PGPUB; USPAT	OR	ON	2011/08/01 15:40
L25	6	22 and (request\$3 or inquir\$3 or acquir\$3)	US-PGPUB; USPAT	OR	ON	2011/08/01 16:27
L26	1	25 not 23	US-PGPUB; USPAT	OR	ON	2011/08/01 16:27
L27	163	((configur\$3 or configuration) with resource) with (characteristic near5 information)	US-PGPUB; USPAT	OR	ON	2011/08/01 16:30
L28	3	27 and SDR	US-PGPUB; USPAT	OR	ON	2011/08/01 16:31
L29	26	27 and ((local or area or region) near7 information)	US-PGPUB; USPAT	OR	ON	2011/08/01 16:31
L30	359472	(request\$3 or inquir\$3 or acquir\$3) near7 information	US-PGPUB; USPAT	OR	ON	2011/08/01 16:40
L31	10754	30 same (establish\$3 near7 (link or connect \$3))	US-PGPUB; USPAT	OR	ON	2011/08/01 16:41
L32	23191	30 with (initial\$3 or initiat\$3)	US-PGPUB; USPAT	OR	ON	2011/08/01 16:42
L33	1761	31 and 32	US-PGPUB; USPAT	OR	ON	2011/08/01 16:42
L34	788	33 and ((local or area or region) near7 information)	US-PGPUB; USPAT	OR	ON	2011/08/01 16:42
L35	157	8 and 34	US-PGPUB; USPAT	OR	ON	2011/08/01 16:42
L36	54	33 and (power near3 status)	US-PGPUB; USPAT	OR	ON	2011/08/01 16:43
L37	1	36 and (interference near3 information)	US-PGPUB; USPAT	OR	ON	2011/08/01 16:44
L38	36	36 and ((configur\$3 or configuration) with resource)	US-PGPUB; USPAT; USOCR	OR	ON	2011/08/01 16:53
L39	875	(establish\$3 near3 (link or connect\$3)) same ((configur\$3 or configuration) with resource)	US-PGPUB; USPAT; USOCR	OR	ON	2011/08/01 16:55
L40	70	32 and 39	US-PGPUB; USPAT; USOCR	OR	ON	2011/08/01 16:56

L41	20	40 and (power near7 (information or status))	US-PGPUB; USPAT; USOCR	OR	ON	2011/08/01 16:57
L42	1696	((interference or interfer \$3) near5 information) same (power near7 (information or status))	US-PGPUB; USPAT; USOCR	OR	ON	2011/08/01 16:59
L43	5	42 same (establish\$3 near7 (link or connect \$3))	US-PGPUB; USPAT	OR	ON	2011/08/01 16:59
L44	368	42 and (establish\$3 near7 (link or connect \$3))	US-PGPUB; USPAT	OR	ON	2011/08/01 17:01
L45	67	44 and 13	US-PGPUB; USPAT	OR	ON	2011/08/01 17:01
L46	31	45 and 18	US-PGPUB; USPAT	OR	ON	2011/08/01 17:01
L47	8	45 and (((configur\$3 or configuration) with resource) with information)	US-PGPUB; USPAT	OR	ON	2011/08/01 17:02
L48	33	44 and (((configur\$3 or configuration) with resource) with information)	US-PGPUB; USPAT	OR	ON	2011/08/01 17:03
L49	31	48 and (8 or 18)	US-PGPUB; USPAT	OR	ON	2011/08/01 17:03
L50	20	49 and ((request\$3 or inquir\$3) near7 information)	US-PGPUB; USPAT	OR	ON	2011/08/01 17:10

**EAST Search History (Interference)**

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**EAST Search History****EAST Search History (Prior Art)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	276605	establish\$3 adj4 (connection or communication or link)	US- PGPUB; USPAT	OR	ON	2011/07/13 13:27
L2	20345	1.ab.	US- PGPUB; USPAT	OR	ON	2011/07/13 13:28
L3	277	2 and ((local or area or region) near7 (rul \$3 or law or regulat \$3))	US- PGPUB; USPAT	OR	ON	2011/07/13 13:29
L4	144872	"455"/\$.ccls.	US- PGPUB; USPAT	OR	ON	2011/07/13 13:29
L5	46	3 and 4	US- PGPUB; USPAT	OR	ON	2011/07/13 13:29
L6	3893	1 same ((local or area or region) near7 (rul\$3 or law or regulat\$3 or information))	US- PGPUB; USPAT	OR	ON	2011/07/13 13:41
L7	157	6 and (information same power same load)	US- PGPUB; USPAT	OR	ON	2011/07/13 13:42
L8	40	4 and 7	US- PGPUB; USPAT	OR	ON	2011/07/13 13:42
L9	40	8 not 5	US- PGPUB; USPAT	OR	ON	2011/07/13 13:42
L10	44	7 and (initia\$4 with (request\$3 or inquir \$3))	US- PGPUB; USPAT	OR	ON	2011/07/13 13:47
L11	1117	6 and (initia\$4 with (request\$3 or inquir \$3))	US- PGPUB; USPAT	OR	ON	2011/07/13 13:51
L12	212	4 and 11	US- PGPUB; USPAT	OR	ON	2011/07/13 13:52

L13	13	12 and (((local or area or region) near7 (rul\$3 or law or regulat\$3 or information)) with power)	US-PGPUB; USPAT	OR	ON	2011/07/13 13:53
L14	8996	(receiv\$3 adj7 information) same (initia\$4 with (request \$3 or inquir\$3))	US-PGPUB; USPAT	OR	ON	2011/07/13 13:59
L15	3450	1 and 14	US-PGPUB; USPAT	OR	ON	2011/07/13 13:59
L16	17	15 and (((local or area or region) near7 (rul\$3 or law or regulat\$3 or information)) with power)	US-PGPUB; USPAT	OR	ON	2011/07/13 14:00
L17	35	14 and (((local or area or region) near7 (rul\$3 or law or regulat\$3 or information)) with power)	US-PGPUB; USPAT	OR	ON	2011/07/13 14:04
L18	18	17 not 16	US-PGPUB; USPAT	OR	ON	2011/07/13 14:04
L19	18	18 not 13	US-PGPUB; USPAT	OR	ON	2011/07/13 14:04
L20	18	19 not 5	US-PGPUB; USPAT	OR	ON	2011/07/13 14:04

**EAST Search History (I nterference)**

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**EAST Search History****EAST Search History (Prior Art)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L7	17253	(software near3 defined)	US-PGPUB; USPAT	OR	ON	2011/06/24 14:39
L8	204	7 and (inquir\$3 with connect\$3)	US-PGPUB; USPAT	OR	ON	2011/06/24 14:40
L9	76	8 and (power near7 information)	US-PGPUB; USPAT	OR	ON	2011/06/24 14:40
L10	71	9 and (interference near7 information)	US-PGPUB; USPAT	OR	ON	2011/06/24 14:40
L11	71	10 and (alter\$3 or adjust\$3 or chang\$3 or configuration or configur\$3)	US-PGPUB; USPAT	OR	ON	2011/06/24 14:41
L12	144128	"455"/\$.ccls.	US-PGPUB; USPAT	OR	ON	2011/06/24 14:41
L13	1	12 and 11	US-PGPUB; USPAT	OR	ON	2011/06/24 14:41
L14	153080	"370"/\$.ccls.	US-PGPUB; USPAT	OR	ON	2011/06/24 14:42
L15	0	11 and 14	US-PGPUB; USPAT	OR	ON	2011/06/24 14:42
L16	71	11 and ((location or local) near7 information)	US-PGPUB; USPAT	OR	ON	2011/06/24 14:44
L17	1	11 and (determin\$3 with ((location or local) near7 information))	US-PGPUB; USPAT	OR	ON	2011/06/24 14:44
L18	10	8 and (determin\$3 with ((location or local) near7 information))	US-PGPUB; USPAT	OR	ON	2011/06/24 14:45



L19	10	18 and (alter\$3 or adjust\$3 or chang\$3 or configuration or configur\$3)	US-PGPUB; USPAT	OR	ON	2011/06/24 14:45
L20	8410	(inquir\$3 with connect\$3)	US-PGPUB; USPAT	OR	ON	2011/06/24 14:50
L21	818	20 and (power near7 information)	US-PGPUB; USPAT	OR	ON	2011/06/24 14:50
L22	99	21 and (interference near7 information)	US-PGPUB; USPAT	OR	ON	2011/06/24 14:51
L23	90	22 and ((location or local) near7 information)	US-PGPUB; USPAT	OR	ON	2011/06/24 14:51
L24	90	23 and (alter\$3 or adjust\$3 or chang\$3 or configuration or configur\$3)	US-PGPUB; USPAT	OR	ON	2011/06/24 14:51
L25	84	24 and load	US-PGPUB; USPAT	OR	ON	2011/06/24 14:51
L26	13	12 and 25	US-PGPUB; USPAT	OR	ON	2011/06/24 14:51
L27	0	25 and (establish\$3 near7 (connect\$3 or communicat\$3 or link))	US-PGPUB; USPAT	OR	ON	2011/06/24 14:54
L28	84	25 and (establish\$3 near7 (connect\$3 or communicat\$3 or link))	US-PGPUB; USPAT	OR	ON	2011/06/24 14:55
L29	13	12 and 28	US-PGPUB; USPAT	OR	ON	2011/06/24 14:55
L30	2	14 and 28	US-PGPUB; USPAT	OR	ON	2011/06/24 14:57
L31	73047	((inquir\$3 or request\$3) near7 information) with (connect\$3 or communicat\$3 or link)	US-PGPUB; USPAT	OR	ON	2011/06/24 14:59

L32	7398	31 and (determin\$3 with ((location or local) near7 information))	US-PGPUB; USPAT	OR	ON	2011/06/24 15:00
L33	3552	32 and (establish\$3 near7 (connect\$3 or communicat\$3 or link))	US-PGPUB; USPAT	OR	ON	2011/06/24 15:00
L34	2461	33 and ((alter\$3 or adjust\$3 or chang\$3 or configuration or configur\$3) with (local or location or area or region))	US-PGPUB; USPAT	OR	ON	2011/06/24 15:01
L35	240	34 and (power same interference)	US-PGPUB; USPAT	OR	ON	2011/06/24 15:02
L36	45	12 and 35	US-PGPUB; USPAT	OR	ON	2011/06/24 15:02
L37	13	34 and (power same interference same ((stat\$3 or feedback) near3 information))	US-PGPUB; USPAT	OR	ON	2011/06/24 15:04
L38	186176	(alter\$3 or chang\$3 or adjust\$3 or reconfigur\$3 or modif\$4) with (device or unit or terminal or apparatus or station) with (location or area or region)	US-PGPUB; USPAT	OR	ON	2011/06/24 15:09
L39	77803	38 and (determin\$3 with (location or area or local or region))	US-PGPUB; USPAT	OR	ON	2011/06/24 15:10
L40	10101	39 and (establish\$3 near7 (connect\$3 or communicat\$3 or link))	US-PGPUB; USPAT	OR	ON	2011/06/24 15:11
L41	1704	40 and (receiv\$3 with (stat\$3 near3 information))	US-PGPUB; USPAT	OR	ON	2011/06/24 15:12

L42	331	41 and (power same interference)	US-PGPUB; USPAT	OR	ON	2011/06/24 15:13
L43	170	12 and 42	US-PGPUB; USPAT	OR	ON	2011/06/24 15:13
L44	86	43 and load	US-PGPUB; USPAT	OR	ON	2011/06/24 15:13

**EAST Search History (Interference)**

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## UNITED STATES PATENT AND TRADEMARK OFFICE

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## BIB DATA SHEET

CONFIRMATION NO. 3717

<b>SERIAL NUMBER</b> 12/203,746	<b>FILING or 371(c) DATE</b> 09/03/2008 <b>RULE</b>	<b>CLASS</b> 455	<b>GROUP ART UNIT</b> 2618	<b>ATTORNEY DOCKET NO.</b> 1004289.386US (4208-4448)		
<b>APPLICANTS</b> Pertti TOLONEN, Aatelikuja 1A, FINLAND; <b>** CONTINUING DATA *****</b> <b>** FOREIGN APPLICATIONS *****</b> <b>** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **</b> 09/15/2008						
Foreign Priority claimed <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No 35 USC 119(a-d) conditions met <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Verified and Acknowledged <u>/SIMON NGUYEN/</u> Examiner's Signature		<input type="checkbox"/> Met after Allowance Initials	<b>STATE OR COUNTRY</b> FINLAND	<b>SHEETS DRAWINGS</b> 23	<b>TOTAL CLAIMS</b> 29	<b>INDEPENDENT CLAIMS</b> 8
<b>ADDRESS</b> Locke Lord Bissell & Liddell IP Docket Department 3 World Financial Center New York, NY 10281-2101 UNITED STATES						
<b>TITLE</b> SOFTWARE-DEFINED RADIO CONFIGURATION						
<b>FILING FEE RECEIVED</b> 2660	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit			

**EAST Search History****EAST Search History (Prior Art)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	291662	establish\$3 near4 (communicat\$3 or connect\$3)	US- PGPUB; USPAT	OR	ON	2011/06/24 08:29
L2	22641	1.ab.	US- PGPUB; USPAT	OR	ON	2011/06/24 08:29
L3	12423	2 and (inquiry or request\$3)	US- PGPUB; USPAT	OR	ON	2011/06/24 08:30
L4	7547	3 and (receiv\$3 near7 information)	US- PGPUB; USPAT	OR	ON	2011/06/24 08:30
L5	9436	3 and (receiv\$3 near7 (respon\$4 or information))	US- PGPUB; USPAT	OR	ON	2011/06/24 08:30
L6	53	5 and ((power near3 (stat\$3 or information)) same interference)	US- PGPUB; USPAT	OR	ON	2011/06/24 08:32
L7	1	12/203746	US- PGPUB; USPAT	OR	ON	2011/06/24 08:32
L8	376441	establish\$3 near7 (communicat\$3 or connect\$3 or link\$3)	US- PGPUB; USPAT	OR	ON	2011/06/24 09:14
L9	54868	8 and ((inquiry or request\$3) with (initial\$3 or initiat\$3 or initialization))	US- PGPUB; USPAT	OR	ON	2011/06/24 09:15
L10	45675	9 and (receiv\$3 near7 (respon\$4 or information))	US- PGPUB; USPAT	OR	ON	2011/06/24 09:15
L11	118	10 and (power same interference same load)	US- PGPUB; USPAT	OR	ON	2011/06/24 09:17
L12	118	11 not 6	US- PGPUB; USPAT	OR	ON	2011/06/24 09:17

L13	10	12 and (software near5 (defined or reconfigura\$4 or configura\$4))	US-PGPUB; USPAT	OR	ON	2011/06/24 09:18
L14	144128	"455"/\$.ccls.	US-PGPUB; USPAT	OR	ON	2011/06/24 09:24
L15	153080	"370"/\$.ccls.	US-PGPUB; USPAT	OR	ON	2011/06/24 09:24
L16	109	12 and (14 or 15)	US-PGPUB; USPAT	OR	ON	2011/06/24 09:24
L17	0	16 and (wlan same bluetooth)	US-PGPUB; USPAT	OR	ON	2011/06/24 09:24
L18	5339	10 and (software near5 (defined or reconfigura\$4 or configura\$4))	US-PGPUB; USPAT	OR	ON	2011/06/24 09:25
L19	100	18 and (wlan same bluetooth)	US-PGPUB; USPAT	OR	ON	2011/06/24 09:26
L20	54	19 and (14 or 15)	US-PGPUB; USPAT	OR	ON	2011/06/24 09:26
L21	54	20 not (13 or 6)	US-PGPUB; USPAT	OR	ON	2011/06/24 09:26
L22	9681	8 same ((inquiry or request\$3) with (initial\$3 or initiat\$3 or initialization))	US-PGPUB; USPAT	OR	ON	2011/06/24 10:05
L23	8122	22 and (receiv\$3 near7 (respon\$4 or information))	US-PGPUB; USPAT	OR	ON	2011/06/24 10:05
L24	4633	23 and ((adjust\$3 or alter\$3 or chang\$3 or configurat\$3 or configur\$3) with information)	US-PGPUB; USPAT	OR	ON	2011/06/24 10:07
L25	70	11 and (power near3 information)	US-PGPUB; USPAT	OR	ON	2011/06/24 10:07
L26	4	25 and (load near5 information)	US-PGPUB; USPAT	OR	ON	2011/06/24 10:08

L27	118	11 and (power same load)	US-PGPUB; USPAT	OR	ON	2011/06/24 10:10
L28	28	11 and (power same load same interference same information)	US-PGPUB; USPAT	OR	ON	2011/06/24 10:10

**EAST Search History (I nterference)**

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**6/ 24/ 11 10:19:38 AM**

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Docket No. 1004289-386US (4208-4448)

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Serial No.:	12/203,746	Confirmation No.:	3717
Applicant(s):	Pertti TOLONEN	Group Art Unit:	2618
		Examiner:	S. NGUYEN
Filed:	September 3, 2008		
		Customer No.:	10928
For:	SOFTWARE-DEFINED RADIO CONFIGURATION		

**AMENDMENT UNDER 37 C.F.R. §1.111**

Mail Stop: Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

Responsive to the Non-Final Office Action (Part of Paper No. 20110803) dated August 15, 2011, reconsideration is respectfully requested in view of the following amendments and remarks. No extension-of-time is believed necessary as this response has been timely filed.

**Amendments to the Claims** are reflected in the “Listing of Claims” that begins on page 2 of this paper; and

**Remarks/Arguments** begin on page 11 of this paper.



**Listing of Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method, comprising:
  - initiating an inquiry from an apparatus to at least one other apparatus;
  - receiving remote characteristic information into the apparatus, the remote characteristic information ~~corresponding to the at least one other apparatus~~ comprising at least one of supported communication transport configuration information for the at least one other apparatus, power status information for the at least one other apparatus, processing load information for the at least one other apparatus, communication load information for the at least one other apparatus, proximate interference information for the at least one other apparatus and user preferences configured in the at least one other apparatus;
  - determining local characteristic information in the apparatus;
  - formulating a configuration in the apparatus, the configuration being based on the remote characteristic information and the local characteristic information;
  - sending the configuration from the apparatus to the at least one other apparatus;
  - implementing the configuration in the apparatus; and
  - establishing communication between the apparatus and at least one other apparatus in accordance with the configuration.
2. (Original) The method of claim 1, wherein the inquiry is conducted via an initialization channel that is established in both the apparatus and the at least one other apparatus.
3. (Canceled).
4. (Original) The method of claim 1, wherein local characteristic information comprises at least one of supported communication transport configuration information for the apparatus, power status information for the apparatus, processing load information for the apparatus, communication load information for the apparatus, proximate interference information for the apparatus, and user preferences configured in the apparatus.

5. (Original) The method of claim 1, wherein the configuration comprises at least information that is required by the apparatus and the at least one other apparatus in order to establish communication via a wireless transport, the wireless transport being determined based on the remote characteristic information and the local characteristic information.
6. (Original) The method of claim 1, wherein the configuration is sent via an initialization channel that is established in both the apparatus and the at least one other apparatus, the at least one other apparatus implementing the configuration that was sent from the apparatus.
7. (Original) The method of claim 1, wherein implementing the configuration comprises discontinuing communication occurring on an initialization channel and resetting resources in the apparatus and the at least one other apparatus in accordance with the configuration.
8. (Original) The method of claim 1, wherein the communication between the apparatus and the at least one other apparatus is established via a wireless transport that is different from the wireless transport utilized to transmit the inquiry from the apparatus.
9. (Currently Amended) A computer program product comprising computer executable program code recorded on a computer readable medium, the computer executable program code comprising:
  - computer program code configured to initiate an inquiry from an apparatus to at least one other apparatus;
  - computer program code configured to receive remote characteristic information into the apparatus, the remote characteristic information ~~corresponding to the at least one other apparatus~~ comprising at least one of supported communication transport configuration information for the at least one other apparatus, power status information for the at least one other apparatus, processing load information for the at least one other

apparatus, communication load information for the at least one other apparatus, proximate interference information for the at least one other apparatus and user preferences configured in the at least one other apparatus;

computer program code configured to determine local characteristic information in the apparatus;

computer program code configured to formulate a configuration in the apparatus, the configuration being based on the remote characteristic information and the local characteristic information;

computer program code configured to send the configuration from the apparatus to the at least one other apparatus;

computer program code configured to implement the configuration in the apparatus; and

computer program code configured to establish communication between the apparatus and at least one other apparatus in accordance with the configuration.

10. (Original) The computer program product of claim 9, wherein the inquiry is conducted via an initialization channel that is established in both the apparatus and the at least one other apparatus.
11. (Canceled).
12. (Original) The computer program product of claim 9, wherein local characteristic information comprises at least one of supported communication transport configuration information for the apparatus, power status information for the apparatus, processing load information for the apparatus, communication load information for the apparatus, proximate interference information for the apparatus, and user preferences configured in the apparatus.
13. (Original) The computer program product of claim 9, wherein the configuration comprises at least information that is required by the apparatus and the at least one other apparatus in order to establish communication via a wireless transport, the wireless

transport being determined based on the remote characteristic information and the local characteristic information.

14. (Original) The computer program product of claim 9, wherein the configuration is sent via an initialization channel that is established in both the apparatus and the at least one other apparatus, the at least one other apparatus implementing the configuration that was sent from the apparatus.
15. (Original) The computer program product of claim 9, wherein implementing the configuration comprises discontinuing communication occurring on an initialization channel and resetting resources in the apparatus and the at least one other apparatus in accordance with the configuration.
16. (Original) The computer program product of claim 9, wherein the communication between the apparatus and the at least one other apparatus is established via a wireless transport that is different from the wireless transport utilized to transmit the inquiry from the apparatus.
17. (Currently Amended) An apparatus, comprising:
  - at least one software-defined radio module; and
  - a processor, the processor being configured to:
    - initiate an inquiry from to at least one other apparatus;
    - receive remote characteristic information, the remote characteristic information ~~corresponding to the at least one other apparatus~~ comprising at least one of supported communication transport configuration information for the at least one other apparatus, power status information for the at least one other apparatus, processing load information for the at least one other apparatus, communication load information for the at least one other apparatus, proximate interference information for the at least one other apparatus and user preferences configured in the at least one other apparatus;
    - determine local characteristic information;

formulate a configuration, the configuration being based on the remote characteristic information and the local characteristic information;  
send the configuration to the at least one other apparatus;  
implement the configuration; and  
establish communication with at least one other apparatus in accordance with the configuration.

18. (Original) The apparatus of claim 17, wherein the inquiry is conducted via an initialization channel that is established in both the apparatus and the at least one other apparatus.
19. (Canceled).
20. (Original) The apparatus of claim 17, wherein local characteristic information comprises at least one of supported communication transport configuration information for the apparatus, power status information for the apparatus, processing load information for the apparatus, communication load information for the apparatus, proximate interference information for the apparatus, and user preferences configured in the apparatus.
21. (Original) The apparatus of claim 17, wherein the configuration comprises at least information that is required by the apparatus and the at least one other apparatus in order to establish communication via a wireless transport, the wireless transport being determined based on the remote characteristic information and the local characteristic information.
22. (Original) The apparatus of claim 17, wherein the configuration is sent via an initialization channel that is established in both the apparatus and the at least one other apparatus, the at least one other apparatus implementing the configuration that was sent from the apparatus.

23. (Original) The apparatus of claim 17, wherein implementing the configuration comprises discontinuing communication occurring on an initialization channel and resetting resources in the apparatus and the at least one other apparatus in accordance with the configuration.
24. (Original) The apparatus of claim 17, wherein the communication between the apparatus and the at least one other apparatus is established via a wireless transport that is different from the wireless transport utilized to transmit the inquiry from the apparatus.
25. (Currently Amended) An apparatus, comprising:
- means for initiating an inquiry from the apparatus to at least one other apparatus;
  - means for receiving remote characteristic information into the apparatus, the remote characteristic information ~~corresponding to the at least one other apparatus~~ comprising at least one of supported communication transport configuration information for the at least one other apparatus, power status information for the at least one other apparatus, processing load information for the at least one other apparatus, communication load information for the at least one other apparatus, proximate interference information for the at least one other apparatus and user preferences configured in the at least one other apparatus;
  - means for determining local characteristic information in the apparatus;
  - means for formulating a configuration in the apparatus, the configuration being based on the remote characteristic information and the local characteristic information;
  - means for sending the configuration from the apparatus to the at least one other apparatus;
  - means for implementing the configuration in the apparatus; and
  - means for establishing communication between the apparatus and at least one other apparatus in accordance with the configuration.
26. (Currently Amended) A method, comprising:
- receiving wireless communication in an apparatus;

if the wireless communication includes an inquiry requesting characteristic information, determining characteristic information ~~corresponding to the apparatus~~ comprising at least one of supported communication transport configuration information for the apparatus, power status information for the apparatus, processing load information for the apparatus, communication load information for the apparatus, proximate interference information for the apparatus and user preferences configured in the apparatus;

responding to the inquiry, the response comprising the characteristic information;  
 receiving further wireless communication in the apparatus, the further wireless communication including a configuration;  
 implementing the configuration in the apparatus; and  
 establishing communication in accordance with the configuration.

27. (Currently Amended) A computer program product comprising computer executable program code recorded on a computer readable medium, the computer executable program code comprising:

computer program code configured to receive wireless communication in an apparatus;

computer program code configured to, if the wireless communication includes an inquiry requesting characteristic information, determine characteristic information ~~corresponding to the apparatus~~ comprising at least one of supported communication transport configuration information for the apparatus, power status information for the apparatus, processing load information for the apparatus, communication load information for the apparatus, proximate interference information for the apparatus and user preferences configured in the apparatus;

computer program code configured to respond to the inquiry, the response comprising the characteristic information;

computer program code configured to receive further wireless communication in the apparatus, the further wireless communication including a configuration;

computer program code configured to implement the configuration in the apparatus; and

computer program code configured to establish communication in accordance with the configuration.

28. (Currently Amended) An apparatus, comprising:
- at least one radio module; and
  - a processor, the processor being configured to:
    - receive wireless communication in an apparatus;
    - if the wireless communication includes an inquiry requesting characteristic information, determine characteristic information ~~corresponding to the apparatus~~ comprising at least one of supported communication transport configuration information for the apparatus, power status information for the apparatus, processing load information for the apparatus, communication load information for the apparatus, proximate interference information for the apparatus and user preferences configured in the apparatus;
    - respond to the inquiry, the response comprising the characteristic information;
    - receive further wireless communication in the apparatus, the further wireless communication including a configuration;
    - implement the configuration in the apparatus; and
    - establish communication in accordance with the configuration.
29. (Currently Amended) An apparatus, comprising:
- means for receiving wireless communication in an apparatus;
  - means for, if the wireless communication includes an inquiry requesting characteristic information, determining characteristic information ~~corresponding to the apparatus~~ comprising at least one of supported communication transport configuration information for the apparatus, power status information for the apparatus, processing load information for the apparatus, communication load information for the apparatus, proximate interference information for the apparatus and user preferences configured in the apparatus;



means for responding to the inquiry, the response comprising the characteristic information;

means for receiving further wireless communication in the apparatus, the further wireless communication including a configuration;

means for implementing the configuration in the apparatus; and

means for establishing communication in accordance with the configuration.

## **REMARKS**

### **I. Status of the Claims:**

Claims 1-29 were pending in the present application prior to this submission. The Examiner objected to claims 3, 11 and 19 as containing allowable subject matter but depending on rejected base claims, while claims 1, 2, 4-10, 12-18 and 20-29 were rejected in the previous Non-Final Office Action.

Claims 1, 9, 17 and 25-29 have been amended herein. Claims 3, 11 and 19 have been canceled herein without prejudice or disclaimer. No new matter is introduced, and thus entry and consideration of this amendment is respectfully requested.

### **II. Allowable Subject Matter:**

The Examiner has objected to claims 3, 11 and 19 as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicants respectfully acknowledge that the Examiner has deemed that claims 3, 11 and 19 to contain allowable subject matter, and have proceeded to incorporate subject matter from these claims into independent claims 1, 9, 17 and 25-29. Claims 3, 11 and 19 have been canceled herein without prejudice or disclaimer.

In view of the above, Applicants respectfully request that the claim objections to claims 3, 11 and 19 now be withdrawn.

### **III. Response to Claim Rejections under 35 U.S.C. §103**

Claims 1-2, 4-10, 12-18 and 20-29 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Abe et al. (US 2008/0200195, hereafter “Abe”) in view of Nasu et al. (US 2004/0266404, hereafter “Nasu”). In particular, the Examiner has alleged that the above claims are obvious in view of the combined teachings of the Abe and Nasu references.

Reconsideration of the present application is respectfully requested in view of the claim amendments and remarks presented herein. For example, amended claim 1 now recites:

1. (Currently Amended) A method, comprising:
  - initiating an inquiry from an apparatus to at least one other apparatus;
  - receiving remote characteristic information into the apparatus, the remote characteristic information comprising at least one of supported communication transport configuration information for the at least one other apparatus, power status information for the at least one other apparatus, processing load information for the at least one other apparatus, communication load information for the at least one other apparatus, proximate interference information for the at least one other apparatus and user preferences configured in the at least one other apparatus;
  - determining local characteristic information in the apparatus;
  - formulating a configuration in the apparatus, the configuration being based on the remote characteristic information and the local characteristic information;
  - sending the configuration from the apparatus to the at least one other apparatus;
  - implementing the configuration in the apparatus; and
  - establishing communication between the apparatus and at least one other apparatus in accordance with the configuration.

The above amended claim 1 incorporates subject matter from claim 3 that the Examiner previously indicated was allowable. Moreover, subject matter from claims 11 and 19 that the Examiner also previously indicated was allowable has been incorporated into claims 9 and 17, respectively. Subject matter substantially similar to that recited in claims 3, 11 and 19 has also been incorporated into claims 25-29. To avoid duplication, claims 3, 11 and 19 have been canceled herein without prejudice or disclaimer.

In view of the above, Applicants respectfully assert that at least amended claims 1, 9, 17 and 25-29 are allowable. The other pending claims not discussed above are also asserted to be allowable for depending from the amended independent claims. Therefore, Applicants respectfully request that the 35 U.S.C. §103(a) rejections to the above claims now be withdrawn.

Serial No. 12/203,746

-13-

Docket No. 1004289-386US (4208-4448)

Response to NFOA dated August 15, 2011

### **CONCLUSION**

Based on the foregoing amendments and remarks, Applicants respectfully request reconsideration, withdrawal of the claim objections/rejections and allowance of this application.

### **AUTHORIZATION**

The Commissioner is hereby authorized to charge any additional fees which may be required for consideration of this Amendment to Deposit Account No. **504827**, Order No. 1004289.386US (4208-4448).

In the event that an extension of time is required, or which may be required in addition to that requested in a petition for an extension of time, the Commissioner is requested to grant a petition for that extension of time which is required to make this response timely and is hereby authorized to charge any fee for such an extension of time or credit any overpayment for an extension of time to Deposit Account No. **504827**, Order No. 1004289.386US (4208-4448).

Respectfully submitted,  
LOCKE LORD BISSELL & LIDDELL LLP

Dated: October 6, 2011

By:



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Elliot L. Frank  
Registration No. 56,641

Correspondence Address:

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**10928**

(212) 415-8600 Telephone

(212) 303-2754 Facsimile

**Electronic Acknowledgement Receipt**

<b>EFS ID:</b>	11123759
<b>Application Number:</b>	12203746
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	3717
<b>Title of Invention:</b>	SOFTWARE-DEFINED RADIO CONFIGURATION
<b>First Named Inventor/Applicant Name:</b>	Pertti TOLONEN
<b>Customer Number:</b>	10928
<b>Filer:</b>	Elliot Lyle Frank/Cheryl Pannell
<b>Filer Authorized By:</b>	Elliot Lyle Frank
<b>Attorney Docket Number:</b>	1004289.386US (4208-4448)
<b>Receipt Date:</b>	06-OCT-2011
<b>Filing Date:</b>	03-SEP-2008
<b>Time Stamp:</b>	12:45:33
<b>Application Type:</b>	Utility under 35 USC 111(a)

**Payment information:**

Submitted with Payment	no
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**File Listing:**

<b>Document Number</b>	<b>Document Description</b>	<b>File Name</b>	<b>File Size(Bytes)/ Message Digest</b>	<b>Multi Part /.zip</b>	<b>Pages (if appl.)</b>
1		4208-4448-1004289-386US-AMDT.pdf	123406 6dbbcac47676a35d766a955db49bce1bde dc3f02	yes	13

## Multipart Description/PDF files in .zip description

	Document Description	Start	End
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	10
	Applicant Arguments/Remarks Made in an Amendment	11	13

**Warnings:****Information:****Total Files Size (in bytes):**

123406

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**National Stage of an International Application under 35 U.S.C. 371**

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If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (07-06)

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<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875					Application or Docket Number <b>12/203,746</b>		Filing Date <b>09/03/2008</b>		<input type="checkbox"/> To be Mailed	
<b>APPLICATION AS FILED – PART I</b>										
(Column 1)			(Column 2)			SMALL ENTITY <input type="checkbox"/> OR		OTHER THAN SMALL ENTITY		
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)			
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A				
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (j), or (m))	N/A	N/A	N/A			N/A				
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A				
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$	=	OR	X \$	=			
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$	=		X \$	=			
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).									
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))										
			TOTAL			TOTAL				
* If the difference in column 1 is less than zero, enter "0" in column 2.										
<b>APPLICATION AS AMENDED – PART II</b>										
(Column 1)			(Column 2)			SMALL ENTITY OR		OTHER THAN SMALL ENTITY		
AMENDMENT	10/06/2011	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	* 26	Minus	** 29	=	0		X \$60=	0	
	Independent (37 CFR 1.16(h))	* 6	Minus	***8	=	0		X \$250=	0	
<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))										
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0	
(Column 1)			(Column 2)			SMALL ENTITY OR		OTHER THAN SMALL ENTITY		
AMENDMENT	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)		
	Total (37 CFR 1.16(i))	*	Minus	**	=		X \$	=		
	Independent (37 CFR 1.16(h))	*	Minus	***	=		X \$	=		
<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))										
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE		
<p>* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.</p> <p>** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".</p> <p>*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".</p> <p>The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.</p>										

Legal Instrument Examiner:  
/VERONICA AUGBURN/

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## NOTICE OF ALLOWANCE AND FEE(S) DUE

10928 7590 11/21/2011  
 Locke Lord LLP  
 IP Docket Department  
 3 World Financial Center  
 New York, NY 10281-2101

EXAMINER

NGUYEN, SIMON

ART UNIT

PAPER NUMBER

2618

DATE MAILED: 11/21/2011

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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12/203,746

09/03/2008

Pertti TOLONEN

1004289.386US  
(4208-4448)

3717

TITLE OF INVENTION: SOFTWARE-DEFINED RADIO CONFIGURATION

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1740	\$300	\$0	\$2040	02/21/2012

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**THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.**

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10928 7590 11/21/2011  
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(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/203,746	09/03/2008	Pertti TOLONEN	1004289.386US (4208-4448)	3717

TITLE OF INVENTION: SOFTWARE-DEFINED RADIO CONFIGURATION

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1740	\$300	\$0	\$2040	02/21/2012

EXAMINER	ART UNIT	CLASS-SUBCLASS
NGUYEN, SIMON	2618	455-552100

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5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/203,746	09/03/2008	Pertti TOLONEN	1004289.386US (4208-4448)	3717
10928	7590	11/21/2011	EXAMINER	
Locke Lord LLP			NGUYEN, SIMON	
IP Docket Department			ART UNIT	
3 World Financial Center			PAPER NUMBER	
New York, NY 10281-2101			2618	

DATE MAILED: 11/21/2011

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**  
 (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 650 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 650 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

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3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

<b>Notice of Allowability</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	12/203,746	TOLONEN, PERTTI	
	<b>Examiner</b>	<b>Art Unit</b>	
	SIMON NGUYEN	2618	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Amendments filed 10/6/11.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are 1,2,4-10,12-18 and 20-29.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All    b) ☐ Some\*    c) ☐ None    of the:
  1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
  - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
    - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_.
  - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_.

**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

<ol style="list-style-type: none"> <li>1. <input type="checkbox"/> Notice of References Cited (PTO-892)</li> <li>2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)</li> <li>3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date ____</li> <li>4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material</li> </ol>	<ol style="list-style-type: none"> <li>5. <input type="checkbox"/> Notice of Informal Patent Application</li> <li>6. <input type="checkbox"/> Interview Summary (PTO-413), Paper No./Mail Date ____.</li> <li>7. <input type="checkbox"/> Examiner's Amendment/Comment</li> <li>8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance</li> <li>9. <input type="checkbox"/> Other ____.</li> </ol>
--	--

/SIMON D NGUYEN/ Primary Examiner, Art Unit 2618	November 16, 2011
---	-------------------

Application/Control Number: 12/203,746  
Art Unit: 2618

Page 2

***Allowable Subject Matter***

1. Claims 1-2, 4-10, 12-18, and 20-29 are allowed.
2. The following is an examiner's statement of reasons for allowance: the prior art of record discloses method and apparatus for establishing communication between a first communication device (apparatus) to a second communication device (other apparatus) in which the first communication device remotely receives information of the second communication device such as power status information, interference information, and user references.

The prior art of record failed to teach or suggest the receiving information further comprising processing load information and communication load information of the second communication device (other apparatus).

***Conclusion***

3. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."
4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Simon Nguyen whose telephone number is (571) 272-

Application/Control Number: 12/203,746

Page 3

Art Unit: 2618

7894. The examiner can normally be reached on Monday-Friday from 7:00 AM to 6:00PM.

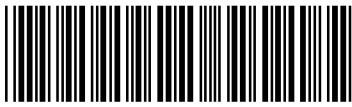
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duc M. Nguyen can be reached on (571) 272-7503. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

November 16, 2011

/SIMON D NGUYEN/

Primary Examiner, Art Unit 2618


<b>Search Notes</b>  	<b>Application/Control No.</b>  12203746	<b>Applicant(s)/Patent Under Reexamination</b>  TOLONEN, PERTTI
	<b>Examiner</b>  SIMON NGUYEN	<b>Art Unit</b>  2618

SEARCHED			
Class	Subclass	Date	Examiner
455	39, 41.2-41.3, 67.11, 515-517, 552.1-553.1, 556.1-556.2	8/3/11	SN
370	338, 342, 343.	8/3/11	SN
Updated		11/16/11	SN

SEARCH NOTES			
Search Notes		Date	Examiner
EAST		8/3/11	SN
EAST		11/16/11	SN

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner
See SEARCH		11/16/11	SN

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<b>Issue Classification</b> 	<b>Application/Control No.</b> 12203746	<b>Applicant(s)/Patent Under Reexamination</b> TOLONEN, PERTTI
	<b>Examiner</b> SIMON NGUYEN	<b>Art Unit</b> 2618

ORIGINAL						INTERNATIONAL CLASSIFICATION									
CLASS			SUBCLASS			CLAIMED					NON-CLAIMED				
455			39			H	0	4	B	7 / 00 (2006.0)					
CROSS REFERENCE(S)						H	0	4	B	17 / 00 (2006.0)					
						H	0	4	M	1 / 00 (2006.0)					
						H	0	4	W	4 / 00 (2009.01.01)					
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					H	0	4	W	4 / 00 (2009.01.01)					
455	41.2	67.11	552.1												
370	338														
														</	

<input checked="" type="checkbox"/> Claims renumbered in the same order as presented by applicant <input type="checkbox"/> CPA <input type="checkbox"/> T.D. <input type="checkbox"/> R.1.47															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	15	17												
2	2	16	18												
	3		19												
3	4	17	20												
4	5	18	21												
5	6	19	22												
6	7	20	23												
7	8	21	24												
8	9	22	25												
9	10	23	26												
	11	24	27												
10	12	25	28												
11	13	26	29												
12	14														
13	15														
14	16														

NONE		<b>Total Claims Allowed:</b>	
		26	
(Assistant Examiner)	(Date)	O.G. Print Claim(s)	O.G. Print Figure
/SIMON NGUYEN/ Primary Examiner. Art Unit 2618	11/16/11	1	1
(Primary Examiner)	(Date)		




EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	3	(power near2 status) same load same interference same communication same information	US-PGPUB; USPAT	OR	ON	2011/11/16 09:27
L2	184	power same load same interference same communication same information	US-PGPUB; USPAT	OR	ON	2011/11/16 09:34
L3	152	2 and (receiv\$3 near5 information)	US-PGPUB; USPAT	OR	ON	2011/11/16 09:34
L4	5	3 and inquiry	US-PGPUB; USPAT	OR	ON	2011/11/16 09:35
L5	25	3 and (local near7 information)	US-PGPUB; USPAT	OR	ON	2011/11/16 09:37
L6	13	5 and (establish\$3 with (communication or connection))	US-PGPUB; USPAT	OR	ON	2011/11/16 09:38

11/ 16/ 2011 9:47:32 AM

<b><i>Index of Claims</i></b>  	<b>Application/Control No.</b>  12203746	<b>Applicant(s)/Patent Under Reexamination</b>  TOLONEN, PERTTI
	<b>Examiner</b>  SIMON NGUYEN	<b>Art Unit</b>  2618

✓	<b>Rejected</b>	-	<b>Cancelled</b>	N	<b>Non-Elected</b>	A	<b>Appeal</b>
=	<b>Allowed</b>	÷	<b>Restricted</b>	I	<b>Interference</b>	O	<b>Objected</b>

<input checked="" type="checkbox"/> <b>Claims renumbered in the same order as presented by applicant</b>				<input type="checkbox"/> <b>CPA</b>		<input type="checkbox"/> <b>T.D.</b>		<input type="checkbox"/> <b>R.1.47</b>	
CLAIM		DATE							
Final	Original	08/04/2011	11/16/2011						
1	1	✓	=						
2	2	✓	=						
	3	O	-						
3	4	✓	=						
4	5	✓	=						
5	6	✓	=						
6	7	✓	=						
7	8	✓	=						
8	9	✓	=						
9	10	✓	=						
	11	O	-						
10	12	✓	=						
11	13	✓	=						
12	14	✓	=						
13	15	✓	=						
14	16	✓	=						
15	17	✓	=						
16	18	✓	=						
	19	O	-						
17	20	✓	=						
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19	22	✓	=						
20	23	✓	=						
21	24	✓	=						
22	25	✓	=						
23	26	✓	=						
24	27	✓	=						
25	28	✓	=						
26	29	✓	=						

**To:** ptopatentcommunication@lockelord.com,Shopkins@lockelord.com,Jmedina@lockelord.com  
**From:** PAIR\_eOfficeAction@uspto.gov  
**Cc:** PAIR\_eOfficeAction@uspto.gov  
**Subject:** Private PAIR Correspondence Notification for Customer Number 10928

Nov 21, 2011 05:23:42 AM

Dear PAIR Customer:

Locke Lord LLP  
IP Docket Department  
3 World Financial Center  
New York, NY 10281-2101  
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 10928 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

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Application	Document	Mailroom Date	Attorney Docket No.
12203746	NOA	11/21/2011	1004289.386US (4208-4448)

To view your correspondence online or update your email addresses, please visit us anytime at <https://portal.uspto.gov/secure/myportal/privatepair>.

If you have any questions, please email the Electronic Business Center (EBC) at [EBC@uspto.gov](mailto:EBC@uspto.gov) with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE  
PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

Complete and send this form, together with applicable fee(s), to: **Mail** **Mail Stop ISSUE FEE**  
**Commissioner for Patents**  
**P.O. Box 1450**  
**Alexandria, Virginia 22313-1450**  
**or Fax (571) 273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Locke Lord LLP  
701 8th Street, N.W., Suite 700  
Washington, D.C. 20001

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/203,746	09/03/2008	Pertti TOLONEN	1004289.386US	3717

TITLE OF INVENTION:

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
Nonprovisional	NO	\$1740.00	\$300.00	\$2040.00	02/21/2012
EXAMINER	ART UNIT	CLASS-SUBCLASS			

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☒ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
- (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Locke Lord LLP  
2 \_\_\_\_\_  
3 \_\_\_\_\_

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Nokia Corporation

Espoo, Finland

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are enclosed:

- ☒ Issue Fee
- ☒ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies \_\_\_\_\_

4b. Payment of Fee(s):

- ☐ A check in the amount of the fee(s) is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☒ The Director is hereby authorized by charge the required fee(s), or credit any overpayment, to Deposit Account Number **504827**

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

The Director of the USPTO is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above.

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature /John E. Hoel/

Date **December 13, 2011**

Typed or printed name **John E. Hoel**

Registration No. **26279**

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

**"FEE ADDRESS" INDICATION FORM****Address to:**  
**Mail Stop M Correspondence**  
**Commissioner for Patents**  
**P.O. Box 1450**  
**Alexandria, VA 22313-1450****Fax to:**  
**571-273-6500****- OR -**

**INSTRUCTIONS:** The issue fee must have been paid for application(s) listed on this form. In addition, only an address represented by a Customer Number can be established as the fee address for maintenance fee purposes (hereafter, fee address). A fee address should be established when correspondence related to maintenance fees should be mailed to a different address than the correspondence address for the application.

**When to check the first box below:** If you have a Customer Number to represent the fee address. **When to check the second box below:** If you have no Customer Number representing the desired fee address, in which case a completed Request for Customer Number (PTO/SB/125) must be attached to this form. For more information on Customer Numbers, see the Manual of Patent Examining Procedure (MPEP) § 403.

For the following listed application(s), please recognize as the "Fee Address" under the provisions of 37 CFR 1.363 the address associated with:

☒ Customer Number: **00197**
**OR**
☐ The attached Request for Customer Number (PTO/SB/125) form.

PATENT NUMBER (if known)	APPLICATION NUMBER
	12/203,746

Completed by (check one):

☐ Applicant/Inventor /John E. Hoel/  
Signature

☒ Attorney or Agent of record 26,279 John E. Hoel  
Typed or printed name  
(Reg. No.)

☐ Assignee of record of the entire interest. See 37 CFR 3.71. (202) 220-6900  
Requester's telephone number  
 Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)

☐ Assignee recorded at Reel \_\_\_\_\_ Frame \_\_\_\_\_ December 13, 2011  
Date

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below\*.

☒ \* Total of \_\_\_\_\_ forms are submitted.

This collection of information is required by 37 CFR 1.363. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 5 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND COMPLETE D FORMS TO THIS ADDRESS.

**SEND TO: Mail Stop M Correspondence, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

## Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
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## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	12203746			
<b>Filing Date:</b>	03-Sep-2008			
<b>Title of Invention:</b>	SOFTWARE-DEFINED RADIO CONFIGURATION			
<b>First Named Inventor/Applicant Name:</b>	Pertti TOLONEN			
<b>Filer:</b>	John E. Hoel/Cheryl Pannell			
<b>Attorney Docket Number:</b>	1004289.386US (4208-4448)			
Filed as Large Entity				
<b>Utility under 35 USC 111(a) Filing Fees</b>				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Basic Filing:</b>				
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
Utility Appl issue fee	1501	1	1740	1740
Publ. Fee- early, voluntary, or normal	1504	1	300	300



Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Extension-of-Time:</b>				
<b>Miscellaneous:</b>				
<b>Total in USD (\$)</b>				<b>2040</b>

**Electronic Acknowledgement Receipt**

<b>EFS ID:</b>	11601062
<b>Application Number:</b>	12203746
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	3717
<b>Title of Invention:</b>	SOFTWARE-DEFINED RADIO CONFIGURATION
<b>First Named Inventor/Applicant Name:</b>	Pertti TOLONEN
<b>Customer Number:</b>	10928
<b>Filer:</b>	John E. Hoel/Cheryl Pannell
<b>Filer Authorized By:</b>	John E. Hoel
<b>Attorney Docket Number:</b>	1004289.386US (4208-4448)
<b>Receipt Date:</b>	13-DEC-2011
<b>Filing Date:</b>	03-SEP-2008
<b>Time Stamp:</b>	09:18:03
<b>Application Type:</b>	Utility under 35 USC 111(a)

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1	Issue Fee Payment (PTO-85B)	4208-4448ptol85b.pdf	205513	no	2
			dbb1cb8238a17f22a8c1604d894440b34fa06116		

**Warnings:****Information:**

2	Miscellaneous Incoming Letter	4208-4448FeeIndicationForm.pdf	173320	no	2
			24d36746c53664d71f59cff9a257c70940a9183b		

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3	Fee Worksheet (SB06)	fee-info.pdf	31995	no	2
			302412b9c5e67ac13d3928165920a17c2498bcb8		

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<b>Total Files Size (in bytes):</b>			410828
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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/203,746	01/24/2012	8103213	1004289.386US (4208-4448)	3717

10928 7590 01/04/2012

Locke Lord LLP  
 IP Docket Department  
 3 World Financial Center  
 New York, NY 10281-2101

**ISSUE NOTIFICATION**

The projected patent number and issue date are specified above.

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**  
 (application filed on or after May 29, 2000)

The Patent Term Adjustment is 793 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

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**APPLICANT(s)** (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Pertti TOLONEN, Aatelikuja 1A, FINLAND;

**To:** ptopatentcommunication@lockelord.com,Shopkins@lockelord.com,Jmedina@lockelord.com  
**From:** PAIR\_eOfficeAction@uspto.gov  
**Cc:** PAIR\_eOfficeAction@uspto.gov  
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Application	Document	Mailroom Date	Attorney Docket No.
12203746	ISSUE.NTF	01/04/2012	1004289.386US (4208-4448)

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